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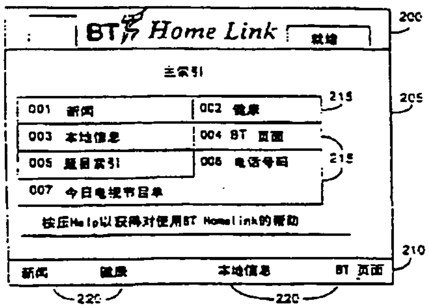
[54]发明名称 基于网络的访问系统

[57]摘要

介绍了一种用于万维网(110)浏览器的接口(105, 125, 120),它识别嵌入在万维网页面中的超文本标示语言(HTML)链接。正常情况,这样的链接在一图形屏幕上作高亮度显示和利用指点装置例如计算机鼠标器激活。当各HTML链接被接口(105, 125, 120)所识别时,它被指定一可由组成有此接口的系统的用户依靠接口定义的而不是鼠标的装置例如一辅助键盘(105)来选择的标识符。



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说　　明　　书

基于网络的访问系统

本发明是关于基于网络的访问系统，其中通过激活包含地址的文件中的链接、例如以激活嵌入在以超文本标示语言(HTML)所写的文件中的链接的方式提供访问。

分布式通信系统中可供应用的信息日益增多。也许最知名的是利用万维网浏览器访问的 Internet（互联网）的万维网（万维网）区域。由文本、图形、音频文件、视频文件等组成的页面每一个均与一分布网络中的一可借助来使它们被访问的地址相联系。有关 HTML 的评述和指导，特别是它在 Internet 的 Web（全球信息检索）环境中的应用，已发表在 JYM Chu,WL Palya 和 DE Walter 的“生成用于信息服务器的超文本标示语言文件”一文中，Behaviour Research Methods, Instruments and Computers, 1995,Vol27(2)，pp200～205。

通常文本的页面被显示在一屏幕上。系统起动时，所显示页面通常由一用户浏览器提供。由第一页面到网络中其它地点的导航通过嵌入在此第一页面中且在屏幕上可看到的链接来实现。通常此链接持有第二地点的地址。当在第一页面中的此链接上用户“点击”（鼠标器），浏览器即被激活去到此链接所保持的地点的地址。这样，任一页面的创作者均可使得其他的页面、文件或应用程序不管它的地理位置如何均可利用由它的自己的页面到 Internet 中的相关地址的链接加以访问。

（这里所用的术语“页面”不应当被理解为仅指文本或图形的页面，而是如果按上下文含义指明的话，也可以是指的那些能通过系统如 Internet 和万维网可加利用的音频文件、视频文件、虚拟现实文件和计算机应用程序（软件））。

现有的万维网浏览器如 Netscape 利用来自指点装置（例如鼠标器）

的点击来选择链接并因此在页面间移动。即就是，此装置在屏幕上定位一光标以便识别一被选择的链接。虽然“对准和点击”（point and click）导航对于熟悉计算机图形用户接口的人们很直观，但这对大部分人们来说情况不是如此。而且有许多情况指点装置不适用，因为成本、复杂性、可靠性、大小、环境等原因。

按照本发明提供一用于通过激活一文件中的链接来访问一网络中的地点的访问系统，此链接含有一地点地址或对一地点地址的标识符，该系统包括：

i）用于检索一或多个文件的装置；

ii）用于搜索一如此检索的文件来定位嵌入在其中的一或多个链接的装置；

iii）用于将一标识符指定给如此定位的任一链接的装置；

iv）由用户用来选择一被指定的标识符的选择装置；和

v)响应标识符的选择来激活此相关链接的激活装置。

取决于所激活链接的性质，或与所激活链接相联系的地点，此访问系统则可由 Internet 访问一数据文件例如文本页面，或者可访问其他类型文件，包括视频或计算机应用程序例如会议应用程序。

与被激活链接相联系的地点另外也可以是一通信网络中一地点，例如一电话或电传号或一电子邮件地址。本申请人分别在 1996.9.29 和 1997.4.16 递交的未决英国专利申请 GB9619958.3 和 GB9707712.7 中揭示了能以这种方式建立通信连接的设备。

通过提供用于链接的标识符和提供一种由其标识符选择一链接的方法来代替直接在屏幕上对链接操作，本发明的实施例使得能采用与通常为一“鼠标器”的经常结合这样的链接应用的指点式装置不同的用户接口。这就是说，用户可选择一较之例如鼠标器的指点装置更适合于他们或更易得到的接口。

采用本发明一实施例甚至可选择一非视觉上的例如以声音呈现给用户的链接。

一其中已经将一不同用户接口用于另外的目的的环境的例子是在家庭中。遥控装置被频繁用于控制家用视听设备，例如带式录象机，高保真音响和电视。当前为在英国应用所生产的电视机相当大一部分还设置有仅能依靠利用遥有手持装置访问的电视文字广播。这就构成了一种熟悉的隐喻措施（metaphor），即采用基于命令的控制系统一根据按键而不是靠指点来控制电子设备。但电视文字广播仅能用于已准备的信息。它不能用于动态的未加控制的环境中，例如利用来自Internet的信息。

本发明的实施例可被提供为例如终端之类的，它可以显示来自在万维网的页面，利用一可替换的“基于命令的”接口来选择嵌入在由此终端上看到的页面中的用于链接的标识符。例如，可设置有简单的电视文字广播式的遥控手持装置和用于屏幕上不同链接的简单的彩色按钮式的标记。用户操作此手持装置来选择一标记，而不必利用“对准和点击”万维网式接口。这样，用户就不必为选择通过一组信息页面的通路来定位屏幕上的指针。代之以可通过一系列激活链接的键按压来实现导航。

应指出的是，虽然下述的特定实施例利用电视屏幕显示万维网信息，而此“基于命令的”接口并不限于使用一电视屏幕，各种各样的其他显示器均可利用。例如，电话上的显示屏可被用来显示此信息，而以电话数字键盘按钮用来控制导航，或者可以生产一移动信息终端，结合以移动电话、传呼机和个人机构的功能，同时利用最小组的按钮。

采用结合屏幕显示器的电话数字键盘按钮的一个示例在本申请人1997.2.13提交的未决欧洲专利申请No.97300929.3中有介绍。

命令接口的具体实现无需基于遥控手持装置上的辅助键盘。具有大量可替换的提供用户命令的方法，它们之中的一些还将在下面详述。

通过本发明一实施例可访问的一应用程序为一会议应用程序。由

本申请人递交的未决英国专利申请 No.GB9620000.1（96.9.25 递交）、GB9620260.1（96.9.27 递交）和 GB9705097.5（97.3.12 递交）以及未决欧洲专利申请 No.EP97302615.6（97.4.16 递交）中介绍了基于屏幕的电话会议应用程序。通过访问一可对一电话会议应用程序进行访问的地点，用户实际上多半首先会被提供一用于此会议中登记的文本页面。因此此会议应用程序的启动可能非常相似于访问来自 Internet 的一文本页面。

要启动的应用程序通过链接地址的文件扩展而被确定。这样--应用程序的另一例是使用户能观察运动图形的视频视窗（viewer）。有许多编码运动图象的方法可供使用。一广泛应用的技术是由国标标准 ISO－IEC11172“对高达约 1.5Mbit/s 的数字存贮媒体的运动图象和声音的编码”(MPEG1)所规定的。符合 MPEG1 的文件通常以文件扩展名“·MPEG”或“·MPG”被命名。适应于以来自 Apple™的 Quick Time™ 视窗观察的文件通常具有文件扩展名“·MOV”。如果一到这样一文件的链接被定位，此链接就被指定给一标识符而如果用户已指明一应用程序要与一特定文件扩展名相关连则此应用程序被自动启动。否则用户将被要求指定要启动的应用程序。类似地一链接可能要求一视频会议应用程序被启动及一视频会议连接被建立。这样的链接必须包括有一应用程序专用文件扩展名，例如用于一视频会议链接的“·VCL”。

本发明一特别优越的方面是，现有的 Web 中正常会遇到的困难——屏幕上通常没有用于此目的的相兼容页面一可加以克服。如上面提到的，一 Web 相兼容页面中的链接被设计成通过用户利用指点装置将光标置于文本中链接的位置而被选择。没有指点装置就不可能选择此链接。但通过将一更通用的标识符指定给该链接，就成会有可能使用例如一辅助键盘。

被指定给一链接的标识符可以是几种型式标识符中的任一个。它必须将在屏幕上同时可观察到的各链接标识成不同于其他链接，和必

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须能由一非指点式装置例如一辅助键盘进行选择。因此，指定给链接的标识符的例子可包括有色彩，在屏幕上各链接以不同彩色表现。然后可使用的辅助键盘上的彩色按钮来选择一链接。可仅只将一链接的起始字母加以色彩。另一例子为数字。各链接在屏幕上可以所加的数字来表示，而利用一辅助键盘来输入相关的数字。数字有助在一链接作为声音代替视频地呈现给用户的应用。现有的链接可给其加一所说的数字而用户利用该数字作为链接标识符。

用于一链接的标识符也可以至少部分地由该链接的正常屏幕显示导出。例如，标识符可以链接自身文本（或图形）的截取版本。这些标识符可连同链接本身一起显现在屏幕上。因此这些链接可表现为被嵌入在屏幕上的文本中如同通常利用 Web 页面那样，但为便于选择也可在屏幕上设置一仅表明标识符的区域。为了将标识符关连到链接，标识符包括来自相关链接的文本（或许一符号）的截取版本。本发明的实施例提供用于在客户端生成该形式标识符的装置，这样而能使任何具有被嵌入的导航链接的原始文本可被用于本发明这样的实施例。

更详细说，虽有可能结合有一链接的页面的作者专门设计此链接以使其能被本发明的实施例所用，而在 Internet 的环境中则显然必须在存贮于服务器处要加以访问的页面中这样完成。在通常的 Web 型环境中在所有可访问的服务处控制页面设计将是不实际的。为了使系统可用于 Internet 上所有可访问的页面、文件、应用程序等，本发明的实施例是基于控制链接在客户端被表现的方法的客户环境。这就是说，设置一客户装置读取所检索的链接和每当需要时通过指定一实际上可替换或补充原先被编写的链接的标识符来转换他们，供在客户装置处显示。

如以上指明的，为清楚起见可取的是本发明的实施例不仅显示链接如它们出现在文本的页面中那样，而且还在屏幕的专用区显示标识符。这些标识符可由一组重复链接的功能性的“热按钮”来设置。例

如在一横过屏幕底部的区域内有一按钮阵列供从中选择可能对于用户将更清楚。这对于熟悉电视文字广播的用户将特别如此。小显示屏幕可能没有用于显示文本的页面以及具有原先编写的链接的屏幕显现的“热按钮”阵列的空间。从而本发明的实施例通过以简单的标识符例如数字或色彩至少对被加到文本的页面的“热按钮”的阵列，代替长的链接描述符将特别有用。

本发明的实施例可用于这样的环境，其中文本的大小相对于可用于显示的屏幕区域很大，但用户仍然需要选择链接。如上面提到的，这发生在屏幕显示器的确很小例如在为用户提供有个人屏幕的飞机中的情况中。但也发生在需要提供大的文本例如因为用户具有降低的视觉能力或者因为需要由远处能看到屏幕的场合。本发明的实施例一般以各种方式使用，其中链接的屏幕显现可为用户环境加以裁剪而不致损失功能性。

总的说，本发明的实施例可提供一种浏览能力，提供如在已知的 Internet 浏览器中的检索数据和交互作用的功能，带有增加的在用户接口处的信息的动态预处理方面。

现在参照附图仅作为举例地描述这里被称之为“简易终端（Easy Terminal）”的终端和接口系统作为本发明的实施例。所列附图为：

图 1 概略地表示简易终端的主要部件；

图 2 表示一引入屏幕的示例；

图 3 表示用于简易终端中的遥控手持装置的示例配置；

图 4 表示简易终端硬件的方框图；

图 5 表示简易终端的软件过程的流程概况；

图 6 表示用于分析 HTML 以寻求到其他页面的链接的过程的流程图；

图 7 表示在用于简易终端的一显示中生成用于文本按钮的文本的过程的流程图；

图 8 为表示在用于对简易终端的一显示中生成用于文本按钮的文

本的再一过程的流程图；

图 9 为记录利用简易终端访问的页面的历史的过程的流程图；

图 10 表示对借助于图 3 的遥控手持装置所作用户选择作出响应的过程的流程图；

图 11 表示通过简易终端排序显示器上所显示链接的过程的流程图；和

图 12～14 表示简易终端中的屏幕显示的灵巧的滚卷过程的流程图。

如上所述，简易终端提供简单的信息接口。此系统被设计来提成一到使用键按压可被访问的文本和图形页面、音频文件、视频文件等形式的电子信息的接口。此信息由万维网导出并在被显示之前加以简化和处理。

参看图 1，简易终端的主要部件为显示器 100，由用户用遥控手持装置 105 控制。信息在万维网上通过网络连接 115 被访问并通过简易终端处理软件 120 处理。

事实上，简易终端提供一公知类型的 Web 浏览器但采用提供明显不同的控制功能的相当不同的用户接口。

显示单元 100 为一标准的电视机，为保证屏幕上文本的最大清晰度，尽可能采用大的同样粗细的字形。如可行的话应采用防混淆的字形。文本和背景色彩被选择得保证良好的对比度。

除了上述的作均匀间隔的文本外，屏幕还可显示高分辩率的彩色图象。

参看图 2，打开电源，给用户显现一具有被划分成三个部分的总体布局的引入屏幕。

主题　200

主体　205

注脚　210

主题 200：屏幕的上部起一固定的“主题”的作用，被用来辩识

所提供服务的名称，以及向用户提供反馈。例如，自辅助键盘输入的数据将出现在此例的左上部，而状态出现在右上部（“就绪”）。

主体 205：屏幕的主要部分供显示万维网页面和/或被处理的万维网信息之用。屏幕的这一部分可被作滚卷以使得被观察的页面能大于可用的屏幕区域。（主题和注脚不受此滚卷影响。）一般，被显示的页面由 5 个主要元素构成：

- 首标，通常很大并为粗体字。现在的情况下被表示的为“主索引”；
- 文本；
- 链接 215（通常表示为带有任选的前置 3 位数的高亮度显示文本）；
- 图形（图象）；和
- 表

一些页面，例如用于特定服务的主页，可能仅仅是用户可由其选择要访问的进一步页面的链接清单。而此进一步页面则一般包括文本和/或图形和表的混合，带有在不规则位置上嵌入的链接。图 2 中所示举例是一仅表明链接清单的主页型式。

注脚 210：屏幕的下面部分也是固定的，为 4 个彩色文本标记 200 提供空间，这些彩色与设置在用户辅助键盘上的按钮的 4 种色彩相匹配：红、绿、黄、蓝。这些是显示 100 主体中出现的链接 215 的缩短版本，并被标以链接 125 的说明性文本或一个三位数。标记 220 使显示 100 的主体 205 中链接 215 的任一个能被激活。标记 220 以 4 个一组出现和最初与显示的主体 205 中所示的第一 4 链接 215 相关联。在显示主体中所示链接被滚卷时，这些标记事实上也可通过操纵辅助键盘 105 上的“Next（下一个）”键被滚卷，这使标记作步进来显示下一组 4 链接。因此，如果这些标记显示说明性文本或一链接号，这在链接被滚卷时可被改变。当所有链接均被滚卷通过和显示时，则再显示第一组。

如果说明性文本被用于作出标记，这可自显示 100 的主体中所示

的链接文本导出。

参看图 3，现在用户可利用遥控手持装置 105 访问新的万维网页面，它们将占有显示 100 的主体。这一实现中的遥控单元 105 为一带有辅助键盘的电视式单元。一适用的手持装置的例子如图 3 中所示具有 25 个按钮。

25 个按钮表示可用功能数量与普通遥控手持装置上可用的按钮数之间的一个折衷方案。

辅助键盘上的 Up（上）和 Down（下）键 300、305 将在显示 100 的主体上看到的当前页面作上滚和下滚。这可以被称之为“灵巧滚卷”的方式来进行。利用 Up 和 Down 键 300、305 移动 HTML 页面的屏幕视图可有二种方式。缺省方式是提供与页面上的链接相关的滚卷。当最初显示一页面时，第一 4 个链接被着色来明明它们与遥控器 4 个彩色按钮或屏幕上的彩色文本标记区相关联。如果 Down 键被按，则是页面上的的下一 4 个链接被着色而第一 4 个链接回复到被用来指明通过遥控器或屏幕上的彩色文本标记区不可用的链接的缺省色。当用户按压 Down 键时，系统检查页面上是否存在当前未作高亮度显示的链接。当页面上最后一可见到的链接被着色时，则随后任一按压 Down 键均将使得屏幕下滚（每次一行）直至到达文件结束或另一未着色的链接被看到。类似的机制可用于向上滚卷处理。

这种方式的“灵巧滚卷”将在下面参照图 12～14 作更详细说明。

一 Back（返回）按钮 310 也可用于在一最小按钮接口中作向上滚卷。

Next（下一）按钮 315 也可被用来滚卷显示，但这被链接至可在屏幕上看到的多个链接，被预定用于需要最小按钮组的特殊应用。Next 钮向下滚卷显示主体直至可看到 4 个链接。然后它们可通过显示 100 的注脚中的各自的彩色文本标记被激活。按压此 Next 钮即滚卷显示以呈现文本的下一页面或下一 4 个链接。这样，链接 1、5、9 等总是与红色钮相关连，链接 2、6、10 等与绿色钮相关连，等等。

在一非最小按钮接口中，此 Next 钮被用来选择页面上下一 4 个链接而不管它们正显示在当前屏幕上，彩色文本标记则将更新来反映链接的变化。

Summary（总括）钮 320 利用一联机文本概括器来产生当前页面的一缩简形式。

通过按压 Help（帮助）325 并自“用户建立”页面选择 Setting（设定），用户可放大或缩小文本的尺寸，并选择仅显示文本字符还是图形及文本字符。

一新的页面可由下列二方法之一进行选择：

Link（链接）和 Number（数字）按钮；

Navigation（导航）按钮。

Link 和 Number 钮为 4 个彩色钮 330 加数字钮 335。如上面提到的，显示 100 主体中的链接可具有一前置 3 位数。为利用此 Link 和 Number 钮来选择一要激活的链接，或者可以按压彩色钮 330 之一，或者可借助辅助键盘 105 上的数字钮 335 来使用一 3 位数代码。

如果按压遥控器上的彩色钮之一，这将产生一对应于显示 100 的注脚中相应彩色标记 220 的新页面。此标记 220 将表明一描述，辨识显示 100 的主体中的当前相关联的链接，正是这一相关链接然后将被激活。

如果使用数字辅助键盘 105 另外输入一 3 位数代码，只要一按压第三按钮，则相应链接被激活并检索一新的页面。如需要更正，则可利用 Del（删除）键删除最近输入的数字。有许多被按压时提供专门功能的可能的 Navigation 钮，可能有的一些是：

Back 310 允许用户回到前面显示的页面；

Index 340 显示在接通电源时看到的主索引页面；

Help 325 显示对应用此终端的求助页面菜单；和

Top 10 345 显示经常和最近被访问的页面的清单。

还有三个允许用户控制页面的装载的控制键：

Stop 350 放弃所要求页面的检索。这可应用于如果因网络问题页面无法利用时或者如果载下不可容忍地缓慢时；

Undo（未示出）这一按钮可被用来将 Stop 和 Del 键的功能加以组合一使用所用时的上下文

Reload 355 刷新当前页，自网络下载新的拷贝。这可用来保证所显示页面是最新的。

通过省略特性，或者通过要求将同时按压的按钮相组合，可采用较少数量的按钮。最小组按钮约为 6 个按钮：4 个彩色钮加“Next”钮和“Back”钮。稍后说明所定名按钮的准确功能。

通过简单“游戏板”控制器，如广泛用于家庭视频/计算机游戏控制台的，设置有最小按钮组的示例。此“游戏板”由配置成二组的 8 个按钮组成：4 个彩色按钮加上另外 4 个通常用于指示方向的有点象原始的操纵杆的按钮。

本发明的实施例中此游戏板按钮的应用如下：

- 4 个彩色钮被用于选择页面上的链接；
- “Up（向上）”和“Down（向下）”按钮滚卷页面和彩色链接（如下述使用“灵巧滚卷”）
- “Back/Delete（返回/删除）”按钮，其功能为“返回”除非在用户编辑文本时，此时它功能为“删除”；和
- “Index/Finish（索引/结束）”按钮，这将用户带到主索引页面，除非在对文本进行编辑，此时它结束此文本。

也可能有其他最少按钮接口。本发明实施例的接口设置可容易地加以扩展。

通过重新定义辅助键盘上按钮的功能可使用仅设置有数字 0～9 加上两个附加按钮的简单辅助键盘（通常作为 3 列×4 行），其中：

- “0”按钮成为“Back”钮；和
- 两个附加按钮被用于向上和向下作页面调度。

参看图 4，这里所说明的 Easy Termlnal 的实现由硬件平台和相应

的软件组成。系统为一被链接的硬件和软件元素的混合体，为生成显示需要这两部分。

用于这里说明的简易终端的实施例的硬件平台由许多部件组成。其中的许多对大部分可替换实施例是共同的。

这些部件列举如下：

通信网络 110	到 Internet 的基于以太网的连接；
网络链接 115	用于个人计算机（PC）的以太网通信卡；
处理器 120	具有 486D×2/60 处理器的网间 P4D-66 IBM 兼容 PC 计算机
硬盘 43	540MB 内部硬盘驱动器
红外线手持装置 105	用于 PC 的 Propresenter Plus 25 按钮手持装置
红外线接收器 41	用于 PC 的 Propresenter URC 接收器
图形卡 44	ATI MACH 64 PCI 图形卡
TV 输出 45	使用用于 PC 的 Creative Laboratories TV 编码器导出

硬件分为 4 个部分：

•控制

•输入

•处理

•输出

控制硬件包括红外线手持装置 105 和接收器 41。

输入硬件包括通信和网络链接 115，它将 PC 连接到万维网 110。

处理器 120 本身为生成输出显示而进行控制和输入数据的处理。

输出是通过使用图形卡和专用的 TV 转换器自计算机显示所产生的 TV 图形的形式。

图 5 表示简易终端中所执行的软件和处理的概括的流程图。该码是以用于 Microsoft Windows 3.1 的 Borland Delphi(Object Oriented

Pascal)编写的。基本步骤如图 5 所列：

步骤 520：搜索到其他页面的链接的 HTML 文件；

步骤 545：配置彩色标记到屏幕和显示；

步骤 550：记录历史；

步骤 555：显示 HTML。

参看图 6～9，现在更详细说明图 5 中所示的每一个基本步骤 520、545、550 和 555。

搜索到其他页面的链接的 HTML 文件：步骤 520

HTML 文件含有如下方式的到其他页面的提及（reference）（也称之为“链接”）：

<A HREF＝“页面提及”>链接文本</A>

其中<a 和</a>分别为指明此提及的起点和终点的标记。页面提及指出所指明页面的万维网地址，将采取http://…的形式。应指出，地址的与当前页面相同的那些部分总是不给出的，而且为生成所需的完整地址经常要求进行地址的某些扩展。

参看图 6，当要在显示 100 的主体中显示一新页面时，必须搜索到其他页面的链接（步骤 520）以便能在显示 100 的主体中将这些链接作与原先文本不同的显示，并使得显示 100 注脚中的标记将显示适当的色彩或说明。

因此，例如当一新的（未被处理的）页面被访问时，通常是因为被一用户要求此系统即启动，步骤 500。

步骤 600 ，含有该页面的 HTML 文件被打开，**步骤 605** 此过程将依次读取文本的各字符以看它是否引入一到另一页面的提及、即一链接。为此它进行一测试，**步骤 610**，“文本读取<a’？”。如果回答为是，此过程将读此文件直至符号“</a>”，**步骤 615**。在此二标记之间，此过程取此文本作为一页面提及、即链接，**步骤 620**，和其全通路名评估该链接，**步骤 625**。（经常 HTML 地址被缩减到此地址与当前面页地址不同的部分。必须扩展这些局部的地址以便能将它们能

与历史清单中存贮的地址相比较。）然后系统将此链接加至被搜索的页面一链接或页面提及的清单，**步骤 630**，并在对标记作处理前存贮此页面提及的文本，**步骤 635**。

在**步骤 640** 中，系统将一 3 位数加到页面提及、或链接文本的前面，以便在显示 100 的主体中显示。此 3 位数也被加到在被搜索的页面中发现的链接清单中的适当的页面提及，并将任何一次相关链接为在显示 100 的主体中显示的第一 4 链接之一时在一标记（或至少与其相关地）中出现。

此后过程将搜索再一个链接直至达到文件的结束，**步骤 645**，且过程被终止，**步骤 650**。

减缩链接文本：**步骤 545**

简易终端在屏幕下部显示 4 个彩色文本标记。大部分 Internet 链接说明均太长。且可能需要截断以便使此 4 标记的总长度能适配在显示器上能辨认的字形的屏幕宽度。

对于用在此实现中的电视显示器，链接说明在显示之前以下述方式作这样的处理以便使它们尽可能易于明了。

参看图 7，在自一页面提及的文本已被存贮以便进行处理来提供一彩色标记，**步骤 635** 时，下一步骤为对各页面提及的文本进行处理。此过程开始检查，**步骤 700、705**，此页面提及是否含有要被截断来提供一标记的文本或者它是否含有已由用户提供一标记的指示符。如果此标记已被提供，则系统将使用该标记，**步骤 710**。对于该特定页面提及，该过程停止，转移到为下一个再次开始。

为允许作者（或其它用户）提供标记，已定义一特殊目的的 HTML 标志。这使 HTML 作者能为此彩色文本标记嵌入予准备的被缩短的文本标记。一个例子将为：

<A HREF=“页面提及”HOTKEY＝“链接 1”>链接文本</A>这样即将 HTML 中<A 命令的功能性进行扩展。

如果标记未被用户定义，此过程检查此页面提及即链接是否为一

图形，**步骤 715**。如果此页面提及的确是一图形，则过程查找 ALT 文本，**步骤 720**。如果此文本存在，这就被用于导出一标记，**步骤 725**。如果不存在此 ALT 文本，则系统分配一 3 位数到相关的页面提及和利用其作为标记，**步骤 730**。

在页面提及为文本，或 ALT 文本存在时，则过程开始截短它。去除任何 HTML 命令，**步骤 735**，而后此页面提及必须被缩短。

首先各链接说明被缩短到一表示 4 个编号链接加一文本链接的特定情形的长度，**步骤 740**。对于这里说明的电视，这近似为 30 个字符。悬置在链接尾部的部分字被去除，**步骤 745**，且此链接被减少一字符，**步骤 750**。一些不必要的字如“THE”和“A”可被去除来进一步降低链接文本的长度，**步骤 755**。单词如“AND”和“OR”可被缩短成“&”和“/”，**步骤 760**。这一过程是名为堵塞的技术的简化形式，和可以采用更复杂的处理来改善截短效率。

最后，许多非标准 HTML 代码必须在显示前加以变换或去除，步骤 765。例如，一版权符号被写成为§copy，而必须在显示前变换成（ C），但是鼓励命令<B>及其反值</B>必须被清除。

在此第一截短步骤之后，存贮标记，或“按钮信息”。

参看图 8，即使在这些修正已完成之后，由此 4 个链接标记组成的链接文本仍然可能还太长，而将溢出屏幕的宽度。当要显示相关的页面时，则系统将进入一第二截短过程。在此阶段，标记将在 4 个中进行处理，其中它们将在显示期间显现在屏幕上。

第二截短过程对标记的长度进行检查，**步骤 800**。如果组合中标记宽于屏幕，链接标记的最大长度即被减少一个字符（即第一到 29，等），而最长的链接标记首先加以处理，**步骤 805**。这“平衡”了在链接之间的标记文本的长度。文本末尾的部分字被去除，**步骤 810**。最后，单词如“AND”和“OR”如果它们是标记文本的最后的字因而是冗余的即被去除，步骤 815。继续进行长度的缩短直到标记适应该屏幕，然后被加以显示，步骤 820。

记录历史：步骤 550

参看图 9，对于以下许多原因被用户选择的页面的历史很重要：

1)用户可能希望退回到他们当前已审阅过的页面；

2)用户可能选择 10 个最近访问的页面的清单；

3)用户可能希望看到他们经常访问的 10 个页面的清单；和

4)活动的记录可被记录。

大部分这些功能都相当简单。但上述 3)所列的要求较复杂。

在当前的实现中，简易终端保持在过去 7 天运行中最常访问的 10 个页面的清单。为此必须首先要有一过去 7 天中已被访问的所有页面的清单：一含有计数器、日期和地址的历史记录。此历史记录将 7 天计数器与各页面相关连，它对这些天中各页面的访问次数加以计数。

参看图 5 和 9。当一新页面被一用户访问过时，此页面提及即被加到一未整理的登记文件，**步骤 900**。这是一所有被访问的页面的简单的清单，且实际上可以是无限长。此附加一新页面提及的过程很直观并在这里不进一步说明。

新页面提及也被加到最近被访问的页面清单，**步骤 905**。该最近被访问的页面清单通过每次增加一页面提及时进行检查此清单有未超过 10 来维持在 10 个页面提及的长度，**步骤 910**。如果已超过，即去掉最老的页面提及，**步骤 915**。这一清单仍然是未加整理的。

除此未经整理的登记文件外，还保持有所有被访问页面的名称的按字母排列的清单，连同一页面被访问过的次数的计数。为更新此字母顺序清单，进行平分搜索来确定此页面是否已取得一登记项，**步骤 920**。如不存在登记项，则随同一组新的 7 个计数器生成一新的登记项，**步骤 925**。如果已存在一登记项，则将相关的日期计数器加以增量，**步骤 930**。

此按字母顺序清单使用户能检查哪些页面被最频繁地访问。辅助键盘 105 上的一按钮或一 3 位数代码可被分配到一功能“示出 10 个被最频繁访问的页面”。如果这被选择，系统能根据计数器的内容分

类此字母顺序清单。这样在选择此 10 个被最频繁访问页面的清单时，系统计数到过去 7 天已被访问的此清单中每一页面的总次数，并对清单分类以便能显示最高的 10 项。

每次一页面被访问，这一天的计数器即被增量。当检测到新的一天开始时将计数器更新，并将过去 7 天内未被访问的页面由此字母顺序清单中去除。

当然也可有其他的维持“最高 10 个”清单的方案。在下面讨论本发明另外的实施例和可能的细化时将提出某些可能的方案。

显示 HTML：步骤 555

采用市场供应的 HTML 显示软件显示被修改的 HTML 代码。因此这里不作进一步说明。但必须对代码作许多次小的修该以便消除未显示图象时的差错消息并去除来自 HTML 热链接的下划线。参见图 10，遥控手持装置 105 使用一标准串行端口协议发送命令。在按压一按钮时，产生一激活具有图 10 中所示功能的子程序的 Windows 事件。这样，此用户接口就成为屏幕显示 100（特别是彩色文本标记）与遥控器 105 上的彩色按钮的组合。

当在遥控器 105 上按压按钮时，这就激活此子程序来在数个端口检索由遥控器 105 输入的数据，**步骤 1000**。然后此子程序将对所检取的数据动作，首先是将数据与可能的按钮标识匹配，**步骤 1005，1010，1015，1020，1025，1030，1035**。依据各次检查的结果，此子程序将分离出不同的处理过程。例如，如发现此按键为一数字键，**步骤 1005**，子程序将相关的数字加到当前号选择存储器，**步骤 1045**，如在当前号选择存储器中现在有 3 位数，这就足以辩识一页面提及，而此子程序由对照在上述步骤 630 和 640 保持的链接清单将此 3 位数翻译成一页面提及，**步骤 1050**。

现在该子程序能启动以自万维网检取页面。

如果此按键不代表一数字而是一热键（hotkey）（即辩识一标记），系统将具有足够的信息直接到达链接清单，**步骤 1050**，并检取页面。

如果此按键提供任一下列功能，此子程序将直接检取一页面：“Index, Help, Top10,Reload, Back or Summary”，**步骤 1015，1020。**

按键可能是一对屏幕作用的控制键，如“Down, Up, Undo”，**步骤 1025，1030。**而后此子程序相应地滚卷或更新屏幕或解除最后的键的按压。

按键可能已经是键“next”，用于显示下一 4 个彩色文本标记。在这一情况中，此子程序将识别“next”命令，**步骤 1035**，并在需要时显示此些标记，**步骤 1065。**为支持此“Next”键功能，系统具有一在观察一文件时对此 Next 键被按压次数进行计数的计数器。这使系统能跟随踪哪一组 4 标记应加以显示。

在此实施例中的最后一选择是该按键代表一“stop（停止）”命令的键，**步骤 1040。**此子程序将通过放弃装载下一页面作出响应，**步骤 1070。**

本发明实施例的优越特征是确定链接出现在屏幕上一页面中的次序，和因此按照屏幕上链接的位置而不是它们在文本中的顺序来控制色彩和/或数的分配。这能保证在当读取文件时链接将总是以通常的方向，例如在西方环境中由左到右和由上到下地顺序出现。否则就可能出现问题，例如在表中号码在屏幕上混乱出现，例如当在一多列的表中仅少量链接可看到时，第一列链接可能仅显示一或二个着色的或编号的链接而其余列则没有着色的或编号的链接。

这一点可通过系统在当页面作予处理时指明链接在当前观察的页面中的在屏幕上的座标来解决。链接可按照它们的“y”和它们的“X”座标被顺序指定序号。一旦建立了这一顺序，即可被加以色彩或提供号码。如果页面在窗中的表述改变、例如如果字形尺寸被改变，则仅需对此页面重复这一过程。

图 11 给出如何实现完善的链接排序的示例，并应与之相结合地阅读以下的说明。

HTML 被逐项读取（步骤 1100）。一项为文本的一段、页面中

的一代码或目标。然后计算各项的大小，再以相对于页面的左上部的X和Y座标“置放”在页面上。如果此目标为一链接（步骤1105），此空间将留作稍后插入链接号（步骤1110）。（如不存在完善的链接排序，则此链接号将是HTML中链接被寻找的次序中的顺序号。从而一旦读取整个文件，就可在屏幕上作出此页面）。

但利用完善的链接次序，各链接的X和Y座标将被以连同有一索引阵列N的包含有顺序指定的整数（图中的L）（步骤1120）的整数阵列指明（步骤1115）。

一旦读入整个文件，即利用一脉动分类算法（步骤1125～1155）来求取具有最低Y座标的从而是最接近页面顶部的链接。如果不只一个链接具有同样的Y座标，这些链接将按它们的X座标排序，从而使得链接被顺序由左至右地读取。这一链接被指定给一随后被增加1的号码。在重复此过程时，这些链接因此被排序。最后这些链接按照它们的Y和X座标被排序。阵列N的作用是作为在选择链接的事件中必须采取的动作的访问。

例如假定HTML如下：

```
<table><tr>
<td><a href="Item1">Apples></a><br>
<a href="Item2">Bananas></a></td>
<td><a href="Item3">Pears></a><br>
<a href="Item4">Plums></a></td>
</table>
```

在一标准的HTML浏览器上，这将产生一4链接的矩阵：

Apples Pears
Bananas Plums

在简易终端中，没有利用完善的链接排序，此些链接被按照链接在HTML代码中出现的次序编号，这样这些链接将呈现为：

001 Apples 003 Pears

002 Bananas 004 Plums

但是利用完善的链接排序，此些链接将被重新排序为：

001 Apples 002 Pears

003 Bananas 004 Plums

和阵列 N 将含有元素（1，3，2，4）。如果现在用户选择链接 2，简易终端可利用提及阵列 N 看到第二元素 N（2）为 3，而因此适当的动作是在于 HTML 中的第三链接，即提及“项 3”。

参看图 12～14，简易终端能如下述提供“灵巧滚卷”。

在“灵巧滚卷”中，可能使所有文本的彩色统一（正常为黑色），而后以 4 种彩色高亮度显示可用的链接（与着色的文本标记相联系）。也可能以一缺省色（例如紫色）来着色不可利用的链接以便能在屏幕上识别这些链接。这样就能将 Next/Down 钮看作为一将被着色（红、绿、黄和蓝）的标记移到下一组紫色链接，而 Back/Up 钮则将色彩转移到前面一组紫色链接。

当作出请求在屏幕上可行窗口中标绘当前的页面，被指定一彩色按钮的第一“有效链接”的索引被标明为 A（步骤 1200）。可在此页面上看到的第一目标的位置即被确定（步骤 1205）。如果此目标为一链接（步骤 1210），则将此链路的索引与 A 相比较（步骤 1220）。如果 L 小于 A，则将此页面上存在有用户可通过按压 UP 来访问的链接，而这些链接被加以紫色。一布尔标志 BEFORE（ 以前）被设定到 TRUE（真）（步骤 1225），指明此页面上存在有带有小于 A 的索引的链接。类似地如果 L>A+3，则存在有通过按压 DOWN 而可由用户可用的链接，所以这些链接也被加以紫色，但布尔标志 AFTER（以后）被设置到 TRUE，（步骤 1230）。否则，该链接被与彩色按钮之一相关连，并被指定为 RED（红色）、GREEN（绿色）、YELLOW（黄色）或 BLUE（蓝色）（步骤 1235）。重复这一过程直至页面上可看到的所有项均被标绘和被指定给适当的色彩。

参看图 13，现在如果用户按压 Down 且 AFTER 为 TRUE（步骤 1300），则通过将 A 增加 4 来使这些现用链接向下页面下移（步骤 1305）。否则此页面上将不再有链接，而因此如果可以即将页面向下滚卷（步骤 1310）。

参看图 14，类似地如果用户按压 UP 且 BEFORE 为 TRUE（步骤 1400），则通过将 A 减少 4 来使这些现用链接向页面上移（步骤 1405）。否则，在页面上不再有链接，因此如果可能即将页面向上滚卷（步骤 1410）。

替代方案和变型

存在有许多可实现简易终端的替代方法，它们提供给用户相似水平的功能性，但对所述硬件和软件有修改。这些将在下面说明和讨论。

尽管这里描述的特定实施例是采用带有以太网连接的 IBM 兼容 PC，但还有许多可在其上实现此简易终端的可替代的平台。而且，万维网信息的再处理和重定可被远程地，或在网络中进行，这将简化用户终端硬件的设计。这样一种安排能特别适宜于一同一系统具有多重用户时，例如在一飞机上用于乘客的交互式屏幕环境中。

电视电话可被用作简易终端的显示器。击键命令可取自电视电话的辅助键盘，通过语音识别或来自一外部控制器。

寻呼机、移动电话、手表或其他移动装置均可用作为简易终端来显示经处理的万维网信息并采用如这里说明的“最小按钮组”导航技术。

简易终端软件自然能在任一具有足够的速度、存贮器和显示容量的计算机平台上运行。这可由例如录象机、卫生广播接收机、数字广播译码器、数字是视频放象机或一游戏控制台来提供。

此简易终端可在一适当地适配的“对话式 TV”或“请求式电视”系统上运行。这可由在用户场所或内容供应者场所运行此简易终端来实现。这样，在第一种情况，通过连接传送的数据将由通常的 Internet 数据流组成，而在第二种情况下它将由编码的视频信号或嵌入式数据

流构成。

简易终端可以与当前电视文字广播被包括进电视接收机的设计中大致相同的方法建立进电视接收机中。在这种情况下，有可能采用非隔行扫描高清晰度模式来改善显示质量。

简易终端可分二部分实现：在用户终端处的被修改来以遥控器 105 解释命令的标准 Internet 浏览器，和对标准万维网页而作适当修改的基于网络的处理器。

简易终端可为数据传送采用任一合适的通信媒体。这包括例如一固定或移动电话网络，广播电视服务或无线导呼服务。

简易终端可利用任何适当的遥控装置 105，或者用户命令的替代来源。这些包括有：

- 带字母数字键的较大控制器；
- 脚控板或涉及人类身体其他部位的控制器；
- 非红外线连接，如射频或有线链接；和
- 与用户无关的语音识别可被用于替代基于按键的控制器，这样简单的单词如“红色”和“下一个”或“23”即可提供链接间的导航装置。

在所有这些可行方案中，简易终端导航的原则包持相同：用户无需为起动一命令来定位一指针。但是，本发明的实施例不排除采用指点装置。例如仍然可利用一鼠标或跟踪球。这使得用户接口与通常的浏览器相同但仍然带来有关本发明的优点。例如，可将用于彩色文本标记的屏幕条用作为无需将鼠标指针移动到实际链接本身的特定位置的快速选择链接的一个途径。这对于其对鼠标器的控制因为例如具体的损坏或者象严重的振动那样的环境条件而受到限制的人们可能是很重要的。彩色文本标记可由彩色框来代替以使这种关系对于那些具有损伤视力的人显得清楚，链接进入本发明的实施例的特殊能力以很大的字形尺寸来显示文本。鼠标驱动器软件可加以调整来限制鼠标指针在屏幕上的位置，限制例如移动到在彩色文本条上的水平位置，或者

可将位置量化来方便 4 个框/区域/标记的选择。

对于鼠标不适宜的情况，可利用较简单的控制装置如踏板、或脚控制器来提控如一鼠标同样的控制能力。

简易终端软件可以任何恰当的计算机语言或协议编写。这可作为一对标准软件的插入，或以一 Internet 语言例如 Java 来实现。

简易终端的许多特性可作为相对于用户远程执行的过程来实现。例如，被编号的链接和被着色的热链接的插入就不一定必须在用户的终端处实现。这样的处理器可被作为网络或广播服务来提供。

简易终端还能提供对通常电视文字广播页面的快速访问。这些页面可被作为源页面的传真显示，或者可利用这里所描述的显示、链接和导航技术来增强。

可为输入文本提供一设施。这可由多种途径来达到。某些可能包括有：

•对于任何文本字段，用户均可由屏幕上的许多选项中选择（这被称之为清单框或“托出（pop-out）”框）。出现在框中的选项包括已由简易终端的建立所知道的项（所有者的名称、地址、电话号等）以及近来进入文本的历史；

•用户可依靠由滚卷即滚动清单来逐一地选择字母作成字母的组合，或字符的网格；

•可通过一次按压多于一个的按钮来将字符与数字辅助键盘相连系；

可通过按压按钮多次来选择字符。这些字符可对应于当前写在电话辅助键盘上的那些。例如为选择“B”将按压二次“2”按钮因为它具有图标符号“ABC”；和

在辅助键盘上设置很大数量的按钮或者将标准键盘附连到此终端，就可能包括有一全字母数字辅助键盘。

概括的作为上述特定实施例的部分的特点可以许多方法进行扩充：

●可给用户提供许多不同等级的概括的选择。这可通过例如重复概括命令来选择；和

●文本概括可自一页带至下一页面。这样，一旦此概括程序被激活，它即运行直至给出命令来禁止它。这可以设置作为一选项或用户参考。

HTML 页面中所用文本的大小可由作者和读者双方确定。HTML 页面的作者可选择针对一标准基准大小的字形的相对大小，这可在整个文件中被改变，读者可选择一定标因子来放大或减小这一基准大小。可提供一控制来自文本去消某些重定大小的信息以便使太大或太小的字形能以较合适的大小显示。

另外，显示器上所采用的最大与最小字形大小间的比例为适应显示类型而可被降低。例如，在计算机屏幕上标题作较大字形很恰当，而当电视屏幕上涉及到文本块的观察时这样同等大小的标题就可能显得太大。

通过彩色改善的导航

可给出一控制来使用户建立用于背景、文本和链路的标准色彩的选择，或者使用由作者所选择的彩色和背景。进一步的细化将是仅允许可能的特定色彩组合，而那些会极大地降低页面的清晰度的可加以改变来保持清楚。

如上面提到的，可利用带有彩色边框的矩形区来指明现用区。这可被延伸来提供用于彩色边框的选项给屏幕上的图象元素（GIF 图形等）。这使得能利用色彩来选择相当于屏幕上“按钮”的链接。

HTML 页面的作者可建议用于他们的页面的背景文本和链接色彩。某些色彩组合可能不适合应用于简易终端的彩色导航方案。这种情况的一个例子可以是在白色页面上的黄色链接，或在黑色页面上的蓝色链接的低对比度。简易终端通过按照所选择的背景调整导航色来克服这种情况。例如，白色背景将促使链接被加暗等等。如果背景色特别接近链接色之一，则简易终端将使背影变暗和使链接色发亮直至

获得合理的对比度水平。

利用多种可行的替代方案的一个或多个可达到页面之间的导航：

●统一长度的编号链接

一页面内统一长度的编号链接（如 01、02、…99）可被用来使用户能利用一数字辅助键盘选择一新的页面。此页面检索可在最后数字被按压后立即开始。应指出，数字位数不一定必须为 3，如上所述，还可按照页面上的链接数量改变。这样，具有小于 10 链接的页面可利用一单数，而带有多于 10 链接的将需要二位。

●可变长度的编号链接

可采用一页面内长度可变的编号链接。用户可通过按压返回键或超过一设定时间，在该设定时间后即认为输入结束，来指明一数的结束。例如，链接可被计数成为（1，2，…11，12）。在此例中，如果用户按压 1，将有一时间延迟使用户能在需要时输入第二位数。另一方面，如果用户按压 3，将无需任何时间延迟因为在此页面上仅 12 个链接。借助如这些的技术，用户可仅利用数目导航和能在需要时去除加色的文本标记。

●与文本主体分开显示的加色文本标记

如上述，在屏幕的下部可显示包含页面上链接文本的概括或特殊编写的文本的彩色文本标记，并由辅助键盘 105 上的相关彩色按钮激活。标记数当然不一定必须为 4，而是可按照屏幕的宽度改变。当屏幕上存在多于具有的相关标记的链接时，可利用一或二个附加键（在此特定实施例中为 Next）来向前或向后循环通过可用的链接。

应注意，如果所用显示器不能以不同色彩表现文本，可在接近标记的屏幕的下部打印彩色记号以使标记能与按钮明显地相关联。

●在文本主体内的彩色文本链接

在另一导航方法中，标记根本无须带有任何文本，而仅仅是不同的彩色。这将涉及到从文本主体去除彩色信息以使得文本的大部分以一单色显示（例如黑色）。然后被嵌入在文本中的链接可以各自不同

色彩显示，与屏幕下部的非常简单的彩色标记相关连。这样，在此特定实施例的情况下具有 4 个彩色标记，文本中的第一链接将显现为红色，第二个为绿色，等等。在辅助键盘 105 上可设置一或二个按钮来循环通过链接以使不同的链接将作高亮度显示以准备好激活。实际上可将文本中的链接着色来替代页面下部的标记。

虽然上述的特定实施例采用可替代的导航方案来访问 HTML 文件中的超级文本链接，但同样的导航方案可被用于访问在表格内 HTML 标记或页面上任何其他目标。

依靠在图象上重叠链接可在导航方案中包括进图形映象。这样采用编号的导航方案时，可将编号的链接以许多不同方式与图象的区域相连系。例如：

•在图象的现用区上闪烁编号的链接；和

•在图象旁向写上号码并以一箭头指向现用区。

•采用彩色导航方案时，可将图象的现用区作高亮度显示，例如借助：

•一围绕图象的现用区的彩色框；

•在图象的局部区域上改变彩色调色板信息，以使一图象的部分显著地显再出链接的色彩；和

•闪烁以恰当色彩填满的区可指明一链接。

由于一映象内的链接可用作为一映射文件，包含在一图象中的链接可表现为一系列的四个彩色文本标记组，它们可利用 Next 命令滚卷。在这一情况中，可用于链接的仅有的说明可是链接自身内部包含的地址，且这样可包含有用信息。这一问题的解决可以是予装载由链接所指向的页面，然后使用该页面的标题作为此链接标记的文本。

用于控制系统的键的数量可按硬件平台和用户要求减少或扩大，许多键配置的变型示例可以是：

•页面间的导航可仅利用数字或仅利用色彩来实现；

•由页面的上、下滚卷，如上述提到的此四个有效链接的组即利用

相关的标记，可自动地按照那些当前可在屏幕上看到的被改变。这样，即可组合在以上说明的特定实施例中的 Next 和 Down 功能；

- 可组合在上述特定实施例中的 Up 和 Back 功能。
- 音频信号可被用作为增援装置。这样，可响应按键或命令发出不同的声音。
- 图形显示技术可用来使简易终端的运行更直观和明显。许多示例如下：
- 一图形指示器可被用来向用户表明当前在屏幕上显示多少和页面的那一部分；
- 可平滑地滚卷彩色文本标记来指明不同标记组之间的关系。在上述特定实施例的情况下，例如一旦按压 Next 按钮，下一四个链接将滚卷进注脚的可视部分；和
- 加阴影可被用来指明在屏幕上在当前看不到的页面区域。

对于某些应用程序，通过使用一组仅包含到此组内的其他页面的链接的特殊设计的页面而可将访问限制到 Internet 的一个子集。还可能按照它们指定的去消链接的传真。例如，可去除所有以“http://undesirable.com”起头的链接。

控制简易终端的其他方法

“BACK（返回）”键

在辅助键盘上选择“0”钮可作为“Back”键的同义词操作。按压#和*（或在辅助键盘上的附加按钮）将按当前屏幕窗的高度上、下滚卷当前页面。

遥控

可由其他应用程序控制简易终端。使用 Windows 发送信息（DDE、OLE、ActiveX、COM、Java）技术、或挂接进同一计算机上的鼠标器或键盘驱动器（例如通过仿真键按压）、或通过串行、并行或网络端口地从其他计算机或设备地，将消息从控制应用程序传送到简易终端。在简易终端的一实现方案中，通过使用 TCP/IP 来实现基于网络

的控制。采用以彩色和数字的简易终端导航尽力于由其他装置作远程控制，和数据共享应用，因为控制和信号不受屏幕布局的操纵。

特别是，用户简单的键盘命令以控制 Web 页面的显示的能力不是其他浏览器中通常可得到的，此控制通常都认为是通过鼠标器。链接的选择通常通过使用鼠标来指向一链接（通常是在一普通浏览器显示上加下划线和着蓝色）然后敲击（键入）此鼠标器铵钮而实现，而在简易终端中这可通过使用彩色文本标记或彩色遥控按钮（或其等效设施）来实现。在通常的浏览器上作滚卷要求准确移动鼠标到滚卷条，然后键入或牵入，或者要利用键盘上的光标键。简易终端的灵巧滚卷仅需要“Next”或“Back”按钮来实现此同样的功能，并还组合有可用链接的屏幕高亮度显示。

这样，简易终端能作一浏览器的键盘控制，这对于鼠标不便于应用或降低效率场合的应用将是很重要的。这样的一个例子是需要具有输入信息到计算机的打印技巧的人也被要求来使用基于 Web 的页面这一情况。简易终端使得这种人能保持它们在键盘上的手而仍然能控制并与屏幕显示相互配合。这对于时间效率高过一切的情况：call Centres（呼叫中心）、Directory Enquiry（目录查询）和其他基于“局（bureau）”的应用特别重要。

被链接的简易终端

可将设置有二简易终端的计算机链接到一起以能利用上述的“遥控”方法之一在它们之间传输命令和控制信息。这一功能作为一标准特性在其他浏览器上目前是不可用的。这使得二简易终端能用于个别辅导、教育、图解、填表、及其他需要在多于一个用户之间进行对话的事例中。这是可能的仅仅是因为简易终端提供对 Web 浏览器的简单控制接口。例如如果二普通浏览器利用应用程序共享被链接在一起，则有关鼠标位置的控制信息将构成所传送控制消息的大部分，而对于简易终端则少量的按钮按压消息就足够了。

可加以交换的信息类型并不只限于控制消息。随加的信息例如显

示设定、当前文件 URL、高亮度的链接及在文件、当前帧中的位置也可加以传送。

高亮度显示的数字

许多公知技术可用于在页面上高亮度显示数字。这包括加粗数字、以“逆影象”显示数字（反转数字和背景颜色）或以一不同的背景色显示数字。

改善的页面表示

智能桅顶（Masthead）

此桅顶对用户显示诸如被按压数字、当前页面状态或其他指令等信息，仅在需要时显示。这样在当一页被完全装载和正被显示中时，完整的显示区间是可用的。

受限宽页面

标准的 HTML 浏览器允许页面具有可变宽和高。如果宽或高超过屏幕参数，用户即给予在屏幕上滚卷文件的能力。简易终端使用户能上、下滚卷文件，但不能作左右滚卷。换句话说，页面决不允许超过显示宽度。这是以如下方式达到的：

•文本在间隔和行分断处被方便地缠绕以使其能填满屏幕的宽。但如果一单个字宽于屏幕则文件必须被滚卷来观察该字。在简易终端中，字的字型大小被缩小使之适应可行的空间；

•如果一图象宽于屏幕则它将被定标来维持其长宽比例使之能适应此屏幕；和

•如果一表宽于屏幕则降低其列的宽度使得所希望宽度的比例保持不变。一表中的文本和图象在需要时被定标来适应表单元。

冗余链接消除

HTML 处理器可将同一页面上二相邻（连续的）链接看作是同一个。因而一图形和相伴的文本（两者指向同一 URL）例如通过彩色和/或数字被指明为同一链接。

形成控制目标

普通浏览器利用屏幕上的控制目标来给用户提供与装置如按钮、检查框和清单框的对话，通常在表中被使用。用户与这些的对话通常要涉及到鼠标的键入。屏幕上的控制、这些目标的大小和色彩是由操作系统确定的且不能轻易改变。当被用于显示文本的字形尺寸被改变时，这些目标未定标来补偿，这意味着对于很大的字形尺寸，它们的尺寸不合比例。

简易终端能显示标准的 HTML 形式的控制目标，但它显示这些通过从图形图元来改绘它们而不是利用标准的操作系统规定。这使得这些目标的大小和其他特性可加以控制。例如，各形式控制目标可具有色彩，数字，并按照当前字形的大小被加以定标。

典型的控制目标包括有：

名称	功能
按钮	提出一形式或作直接选择
无线按钮	选择多个选项中的仅一个
检查框	选择多个选项
组合框	选择多个上托（pup-up）选项之一
清单框	选择多个被列出的选项的一或多个
编改框	利用键盘的圆盘传送写入一单行的字母数字串
文本区	写入多个字母数字串

某些形式控制目标可被指定给如控制屏幕这样的专门功能。

如利用其他的简易终端用户接口特性，这些控制目标可用许多色彩来操纵，它们中的一些是：组合框、清单框、编辑框和文本框需要用户再通过数字或彩色来选择控制中的项目。在组合框和清单框的情况下，这些项目被编号和着色；在编辑框和文本区中，字母的圆盘传送通过彩色被控制，而控制焦点被从页面移到控制。页面上的彩色链接暂时回复到缺省链接的彩色而焦点是在控制目标中。屏幕下部的彩色文本标记反映了用户可用的当前彩色选项，在此情况下为控制目标

选项。

一旦用户完成了控制目标中的选择，焦点回到页面而链接的着色也将返回。

滑动显示（slideshows）

简易终端滑动显示由一系列文件或 URL 和定时信息组成。

简易终端的滑动显示实现采用扩展型式为.sho 的文件。这些文件由按数秒计的时间和 URL 的清单组成，例如：

10 URL1

5 URL2

在此例中，URL1 将显现 10 秒的周期，和 URL2 将显现 5 秒钟。此后，此循环将加以重复直至用户以按压任一控制键进行干予为止。

这种功能性是吸引人的因为为将它们用于滑动显示中无需时页面作任何修改。

这一功能也可与链接的简易终端一起应用，在此二用户可观察同一滑动显示。当任一用户按压一控制键时此滑动显示停止。

98.12.17

说 明 书 附 图

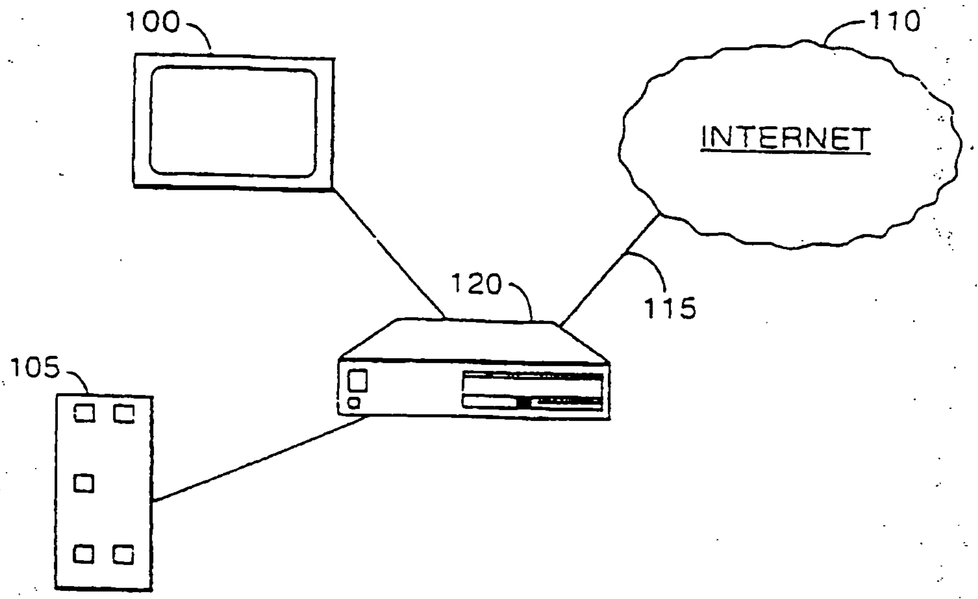


图1

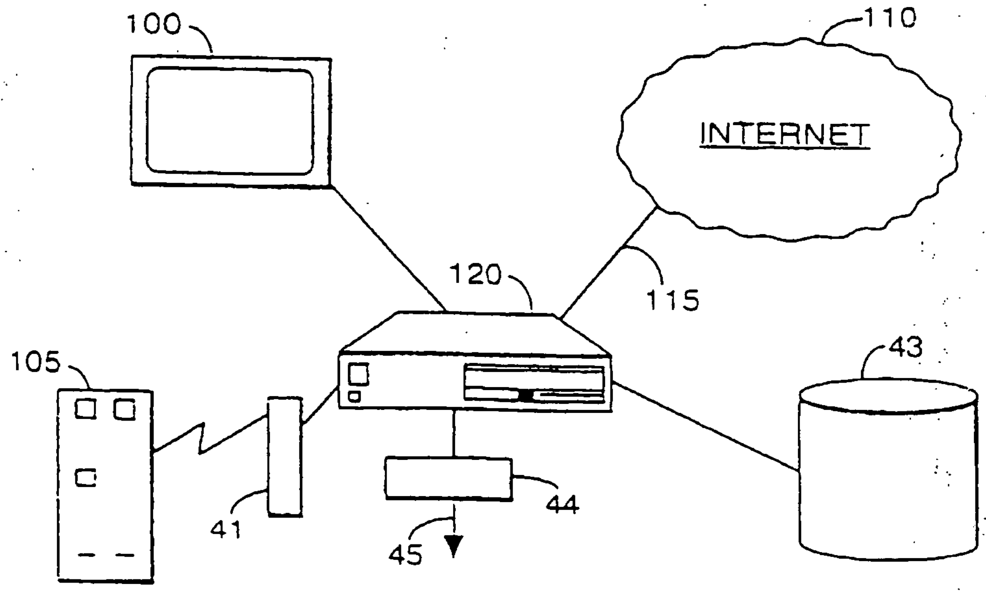
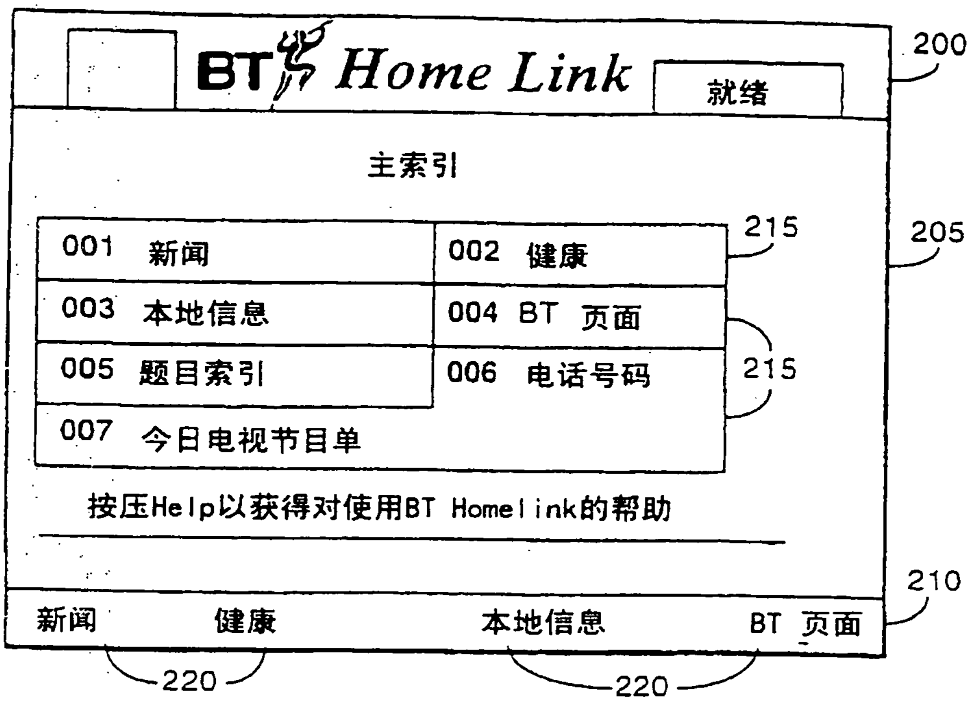


图4

98.12.17



001 新闻	002 健康
003 本地信息	004 BT 页面
005 题目索引	006 电话号码
007 今日电视节目单	

按压Help以获得对使用BT Homelink的帮助

图2

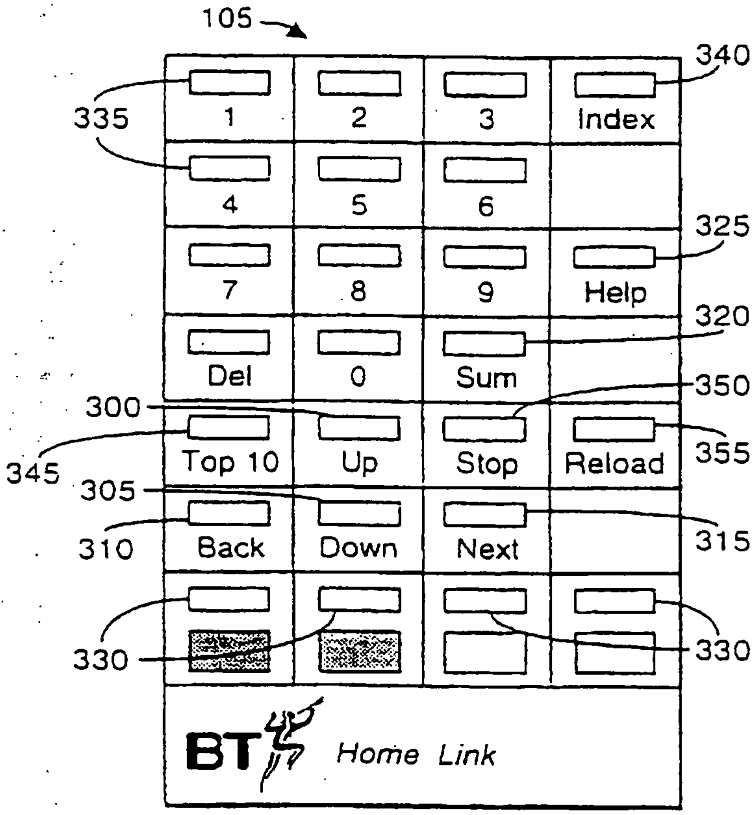


图3

98.12.17

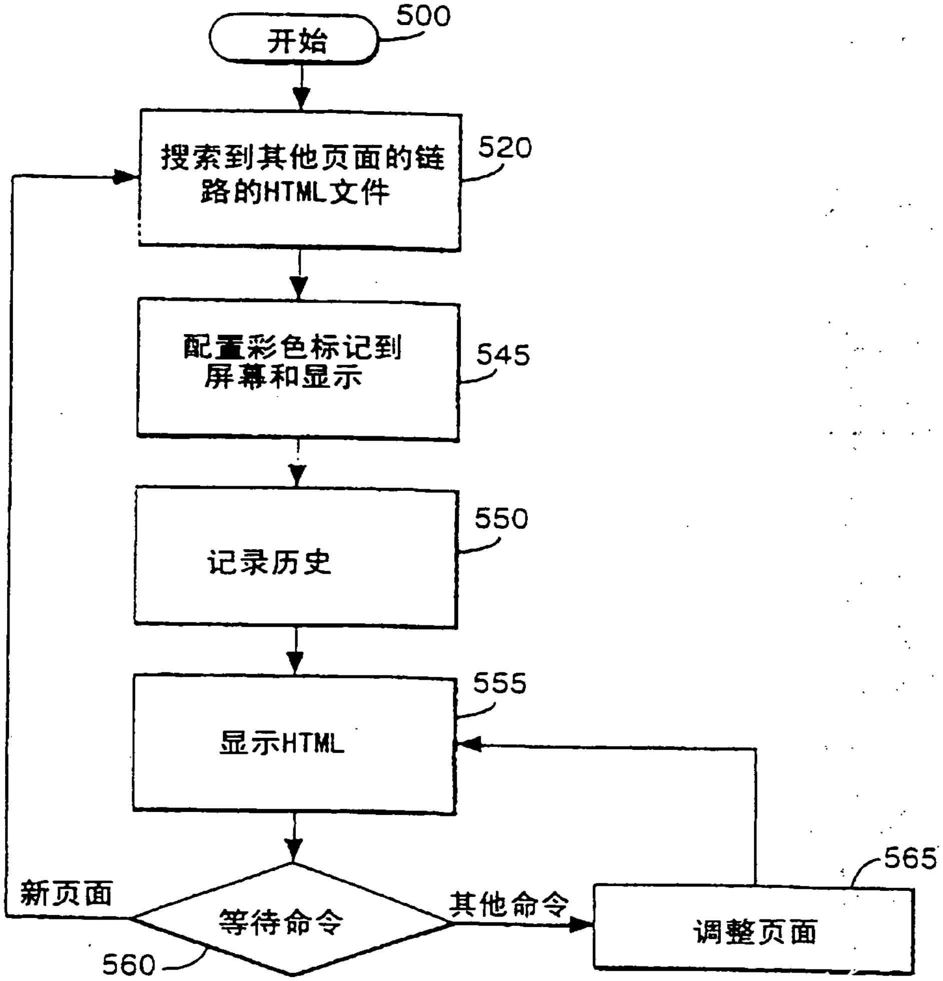

开始
500
搜索到其他页面的链路的HTML文件
520
配置彩色标记到屏幕和显示
545
记录历史
550
显示HTML
555
新页面
等待命令
560
其他命令
调整页面
565

图5

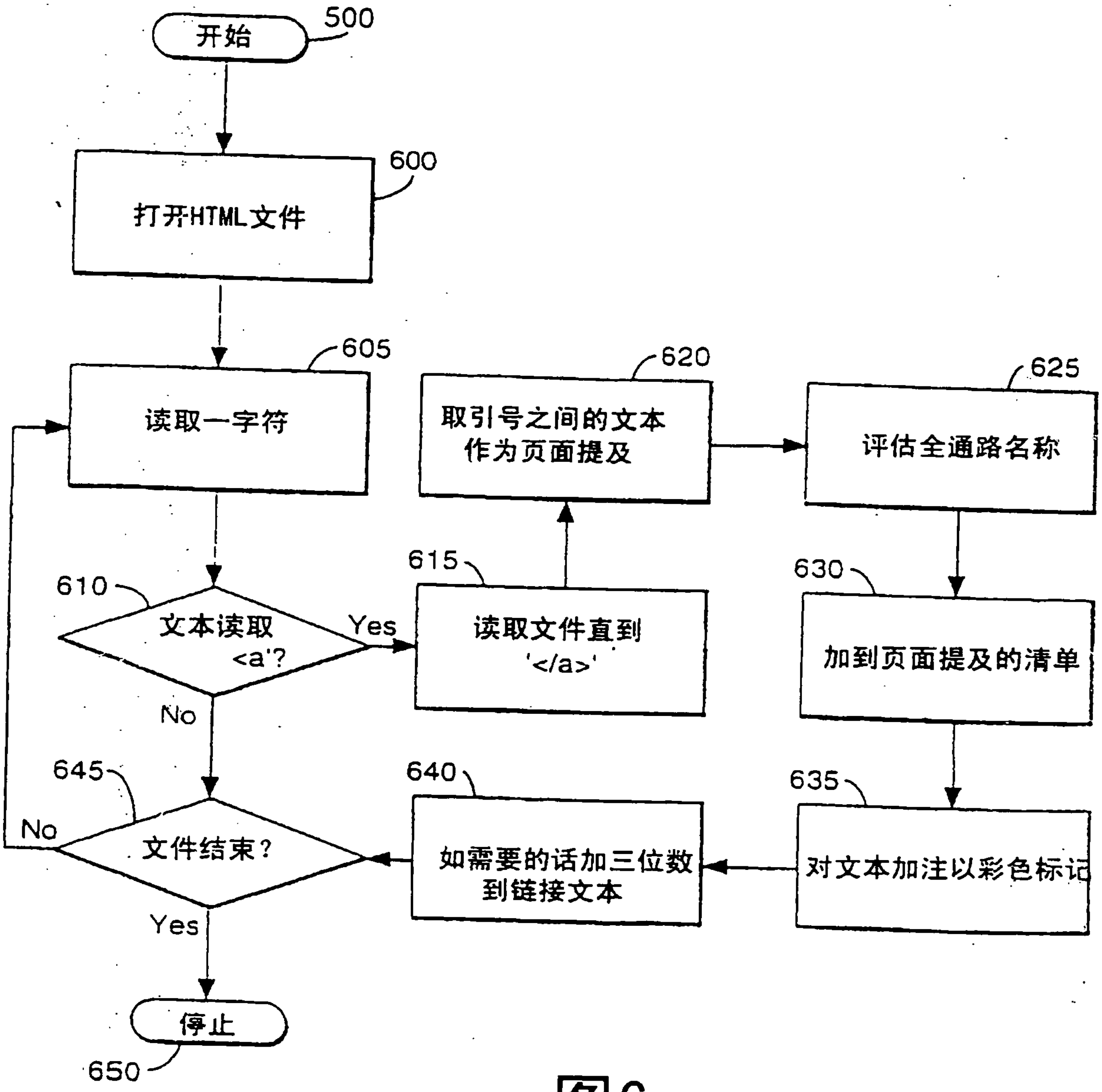

开始
500
打开HTML文件
600
读取一字符
605
610
文本读取 <a'?
Yes
No
读取文件直到 '</a>'
615
取引号之间的文本作为页面提及
620
评估全通路名称
625
加到页面提及的清单
630
对文本加注以彩色标记
635
如需要的话加三位数到链接文本
640
文件结束？
645
No
Yes
停止
650

图6

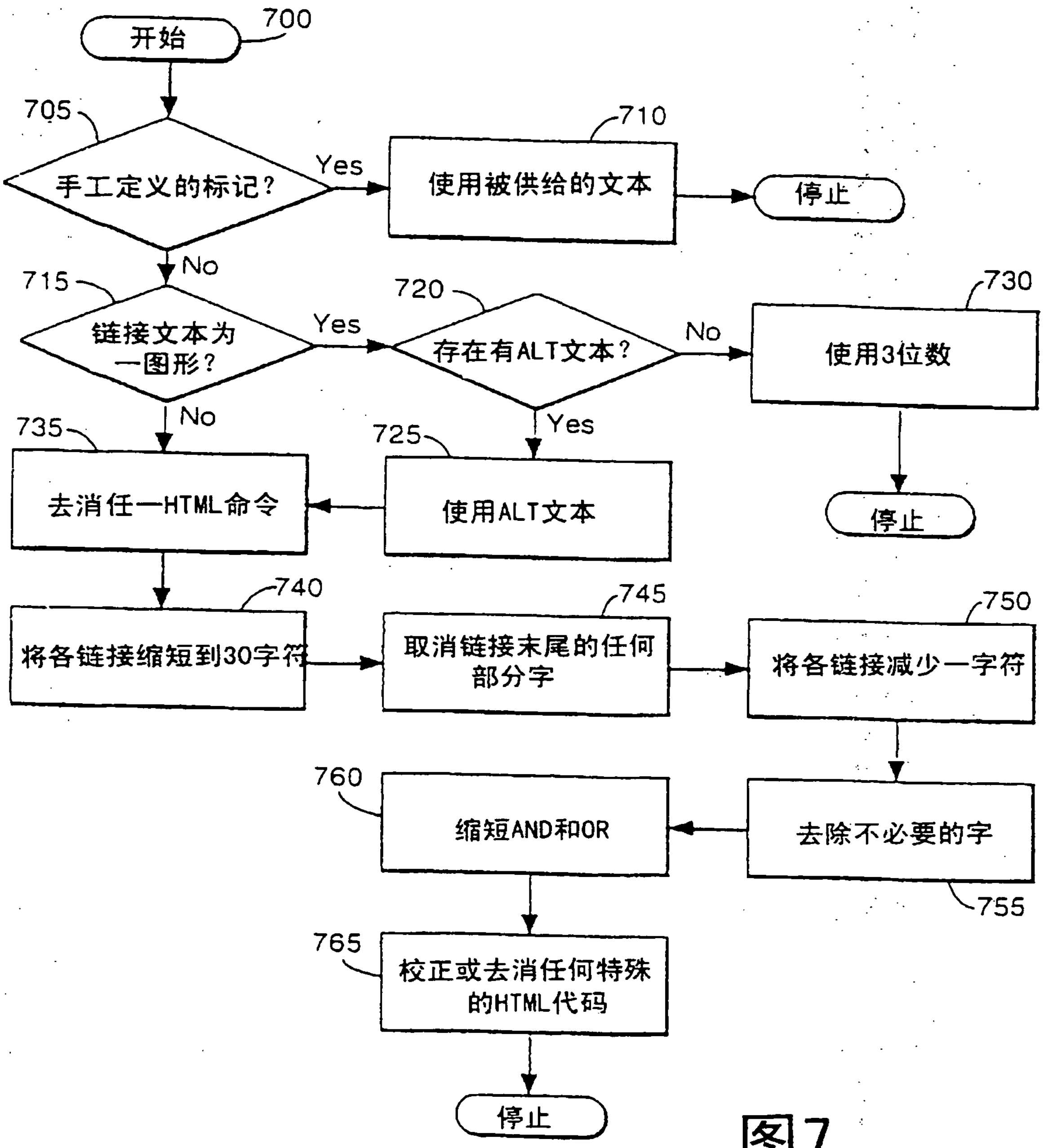

开始
700
705
手工定义的标记？
Yes
710
使用被供给的文本
停止
No
715
链接文本为一图形？
Yes
720
存在有ALT文本？
No
730
使用3位数
停止
No
735
去消任一HTML命令
Yes
725
使用ALT文本
740
将各链接缩短到30字符
745
取消链接末尾的任何部分字
750
将各链接减少一字符
760
缩短AND和OR
去除不必要的字
755
765
校正或去消任何特殊的HTML代码
停止

图7

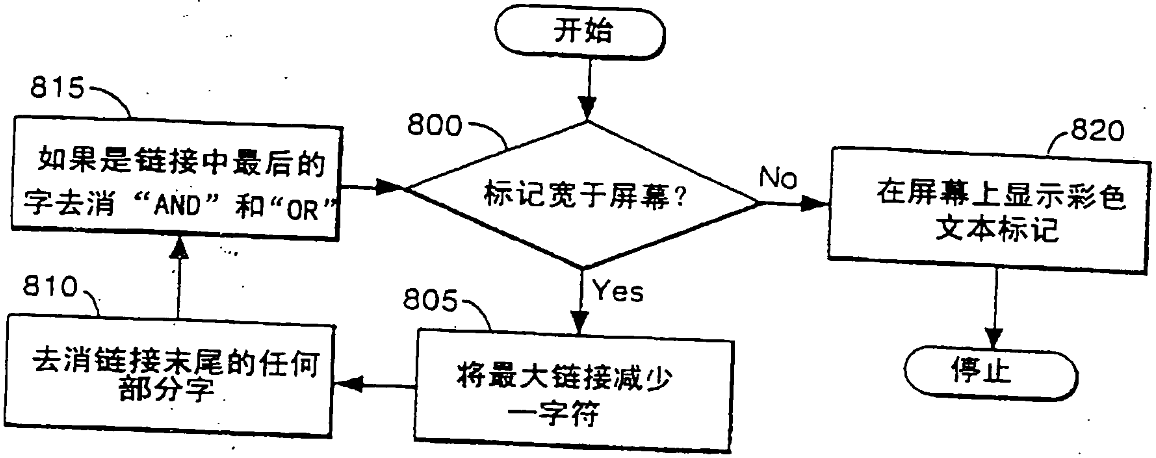

开始
800
标记宽于屏幕？
No
820
在屏幕上显示彩色文本标记
停止
Yes
805
将最大链接减少一字符
810
去消链接末尾的任何部分字
815
如果是链接中最后的字去消“AND”和“OR”

图9

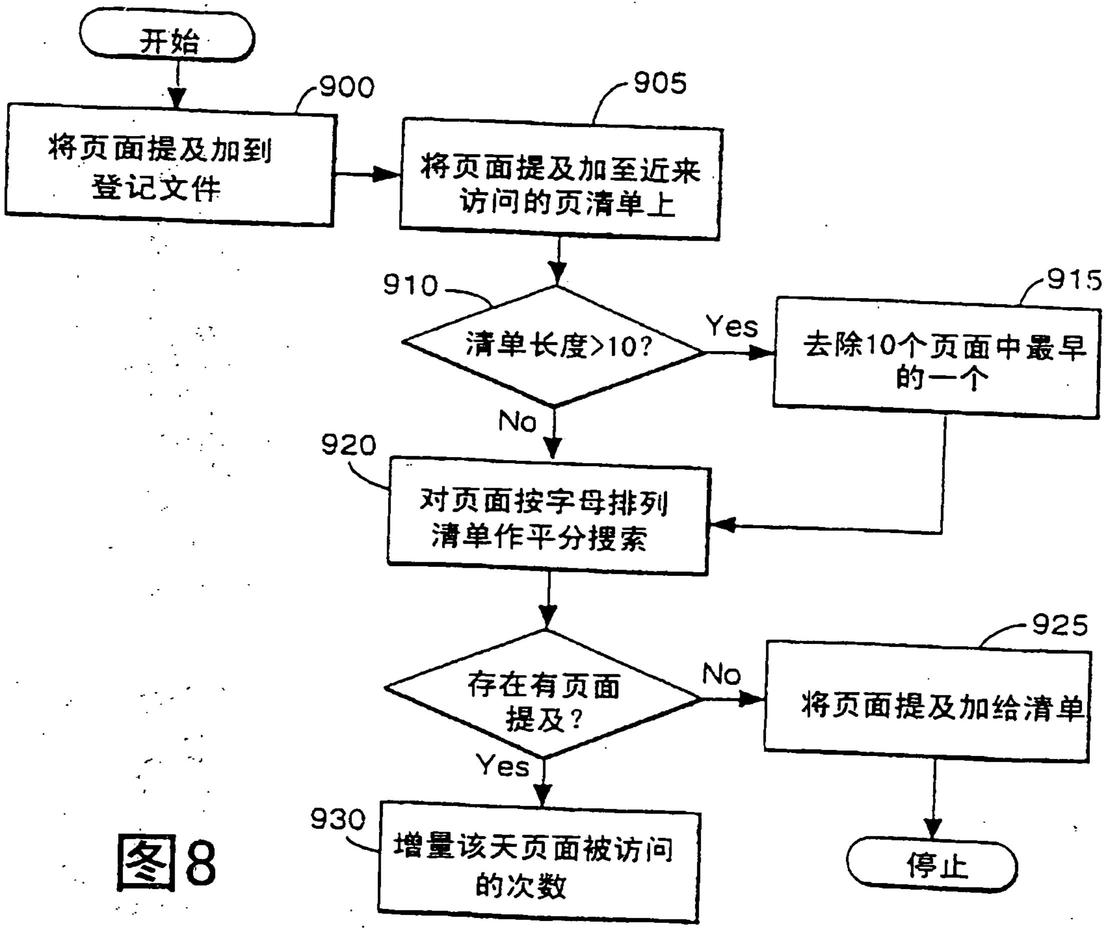
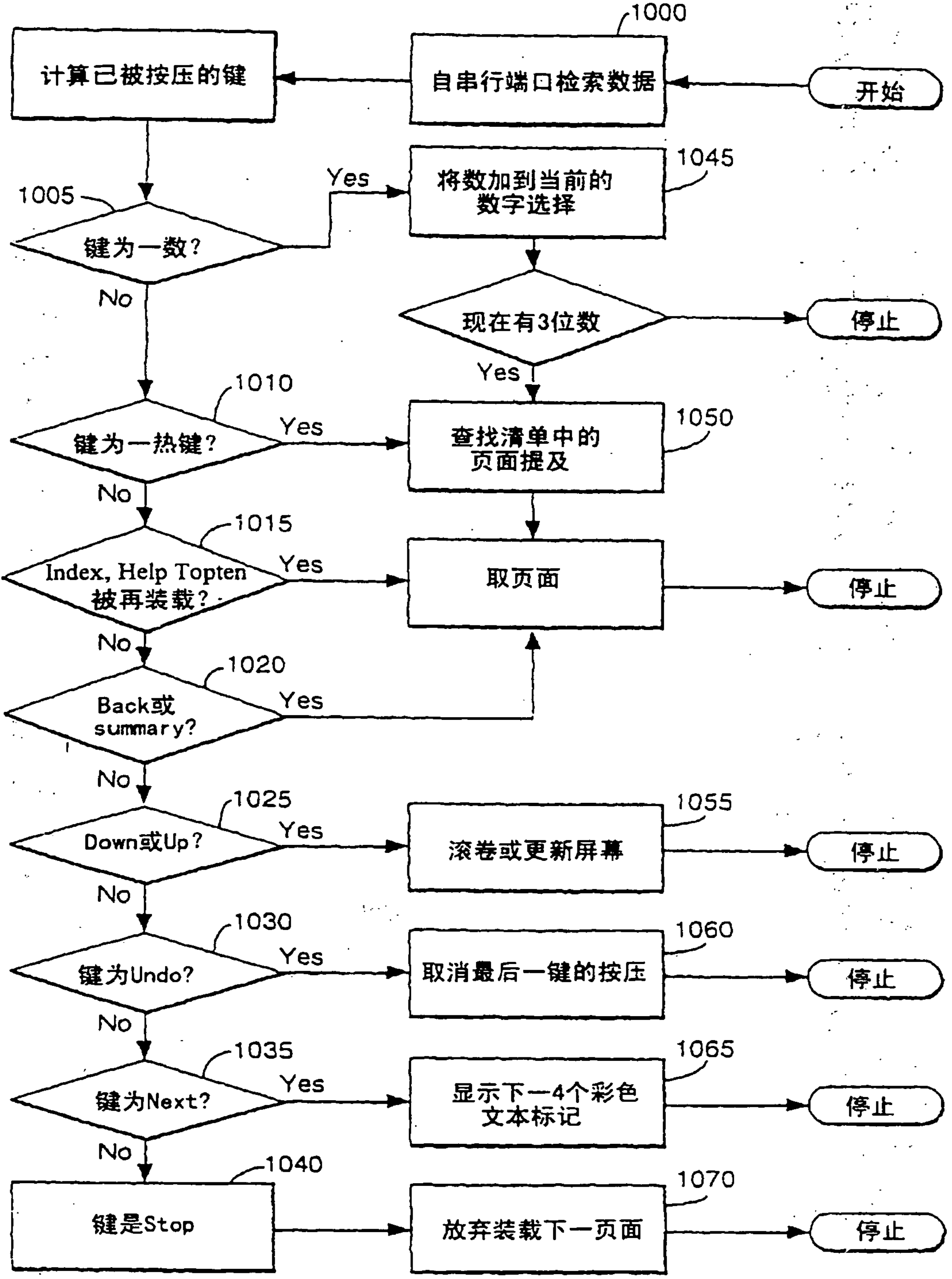

开始
900
将页面提及加到登记文件
905
将页面提及加至近来访问的页清单上
910
清单长度>10？
Yes
915
去除10个页面中最早的一个
No
920
对页面按字母排列清单作平分搜索
存在有页面提及？
No
925
将页面提及加给清单
停止
Yes
930
增量该天页面被访问的次数

图8

98·12·17



开始
1000
自串行端口检索数据
计算已被按压的键
1005
键为一数？
Yes
1045
将数加到当前的数字选择
现在有3位数
停止
Yes
No
1010
键为一热键？
Yes
1050
查找清单中的页面提及
No
1015
Index, Help Topten被再装载？
Yes
取页面
停止
No
1020
Back或summary?
Yes
No
1025
Down或Up？
Yes
1055
滚卷或更新屏幕
停止
No
1030
键为Undo?
Yes
1060
取消最后一键的按压
停止
No
1035
键为Next?
Yes
1065
显示下一4个彩色文本标记
停止
No
1040
键是Stop
1070
放弃装载下一页面
停止

图10

12·17

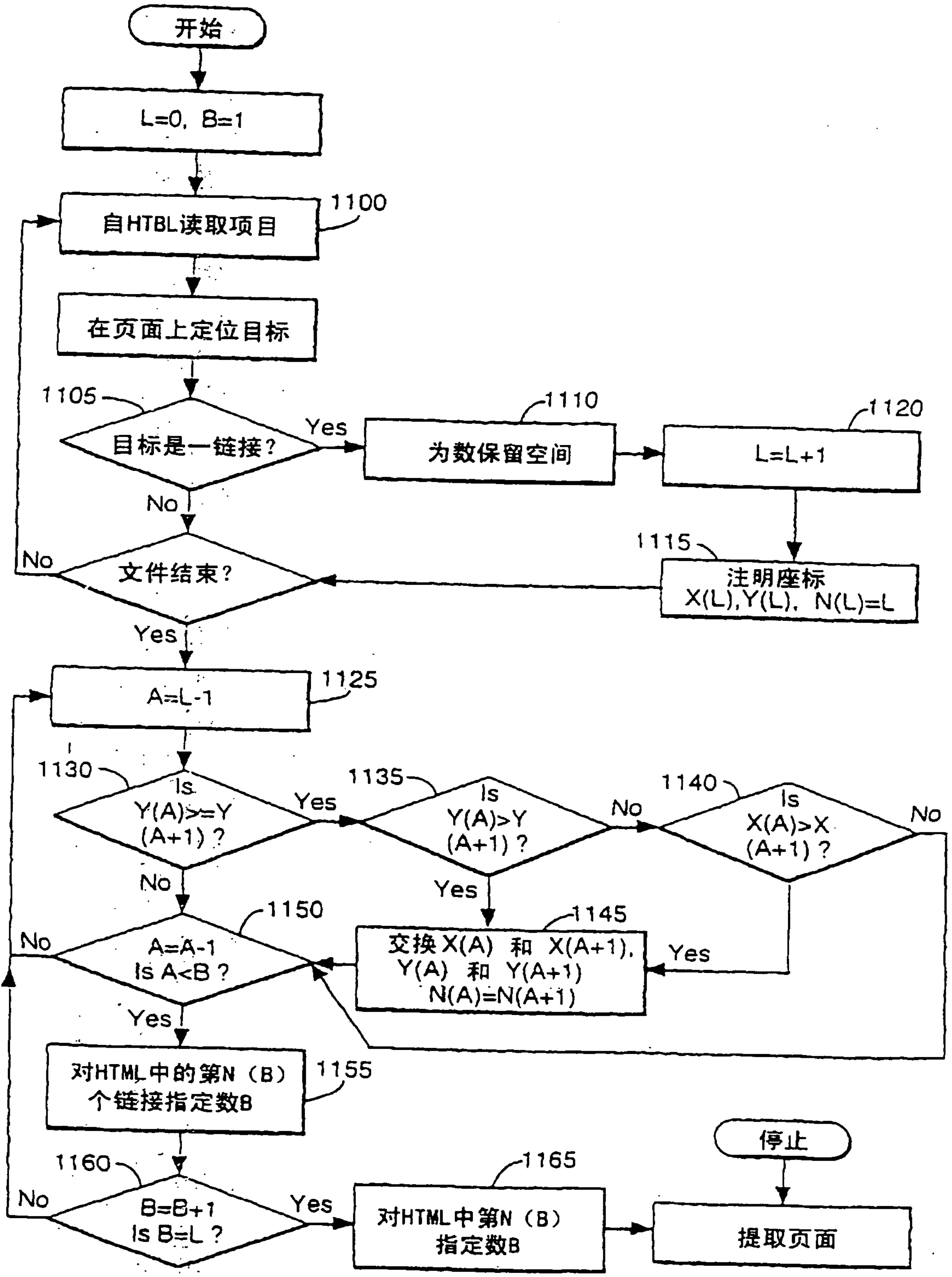

开始
L=0, B=1
1100
自HTBL读取项目
在页面上定位目标
1105
目标是一链接?
Yes
1110
为数保留空间
1120
L=L+1
No
1115
注明座标
X(L),Y(L), N(L)=L
No
文件结束?
Yes
1125
A=L-1
1130
Is
Y(A)>=Y
(A+1) ?
Yes
1135
Is
Y(A)>Y
(A+1) ?
No
1140
Is
X(A)>X
(A+1) ?
No
No
Yes
1150
1145
No
A=A-1
Is A<B ?
交换 X(A) 和 X(A+1),
Y(A) 和 Y(A+1)
N(A)=N(A+1)
Yes
Yes
对HTML中的第N（B）
个链接指定数B
1155
停止
1160
1165
No
B=B+1
Is B=L ?
Yes
对HTML中第N（B）
指定数B
提取页面

图11

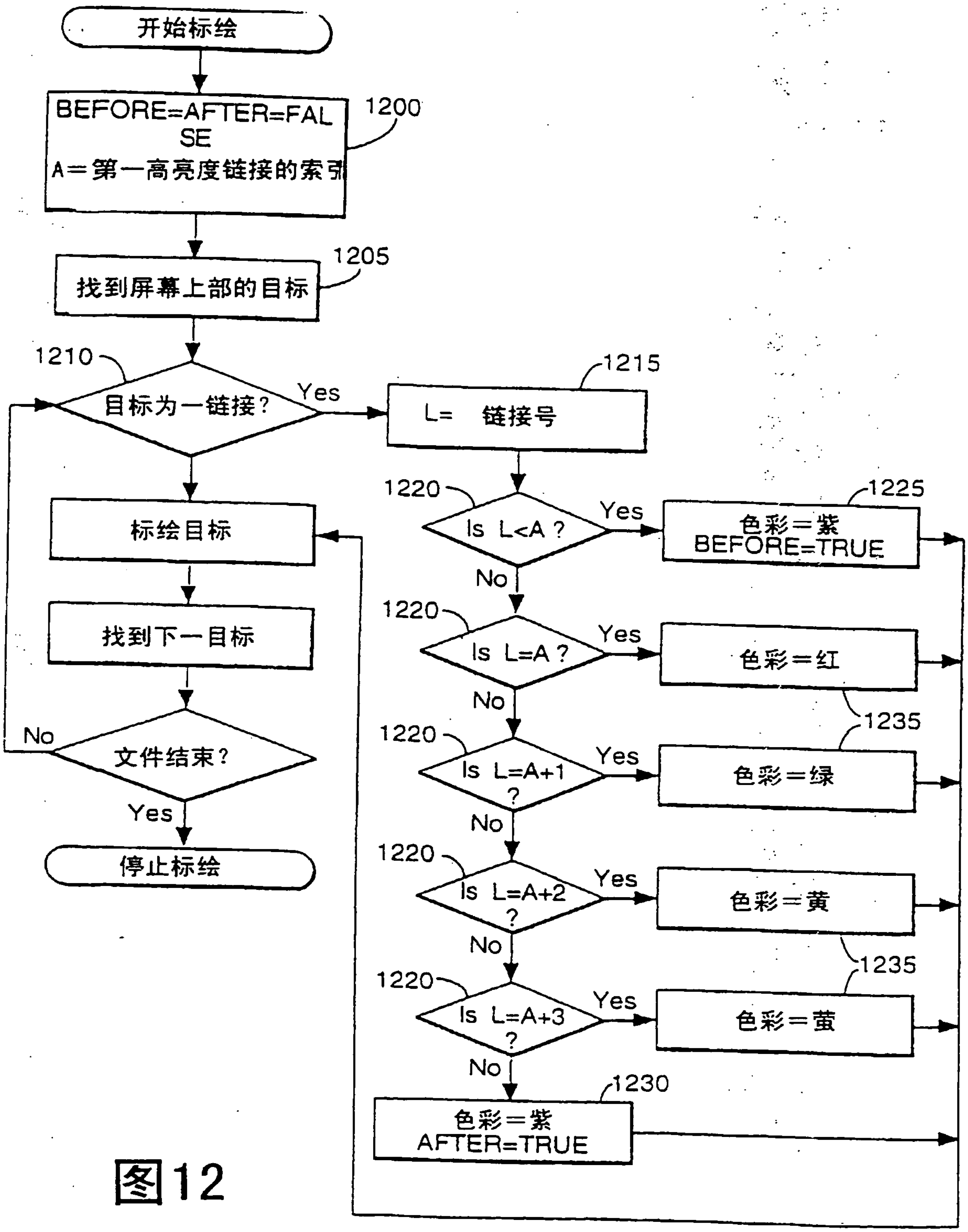

开始标绘
BEFORE=AFTER=FALSE
A＝第一高亮度链接的索引
1200
找到屏幕上部的目标
1205
1210
目标为一链接？
Yes
L=　链接号
1215
No
标绘目标
找到下一目标
文件结束？
Yes
停止标绘
1220
Is L<A ?
Yes
色彩＝紫
BEFORE=TRUE
1225
No
1220
Is L=A ?
Yes
色彩＝红
No
1235
1220
Is L=A+1 ?
Yes
色彩＝绿
No
1220
Is L=A+2 ?
Yes
色彩＝黄
No
1235
1220
Is L=A+3 ?
Yes
色彩＝萤
No
1230
色彩＝紫
AFTER=TRUE

图12

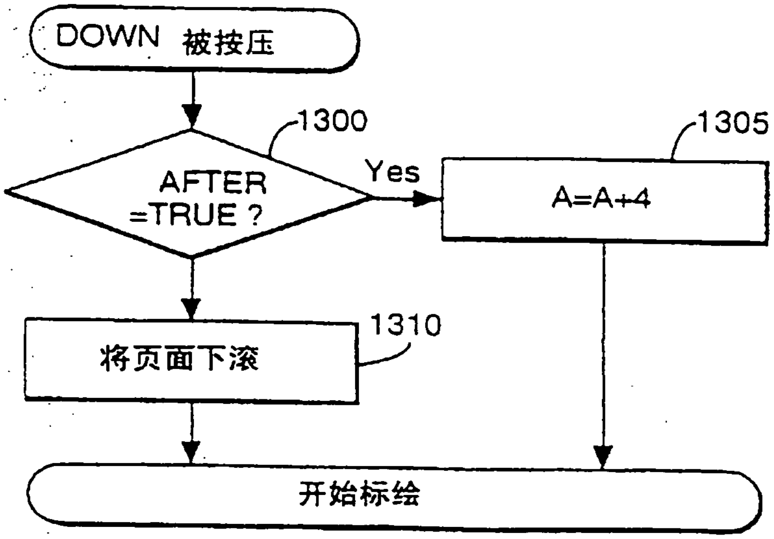

DOWN 被按压
1300
AFTER =TRUE ?
Yes
1305
A=A+4
1310
将页面下滚
开始标绘

图13

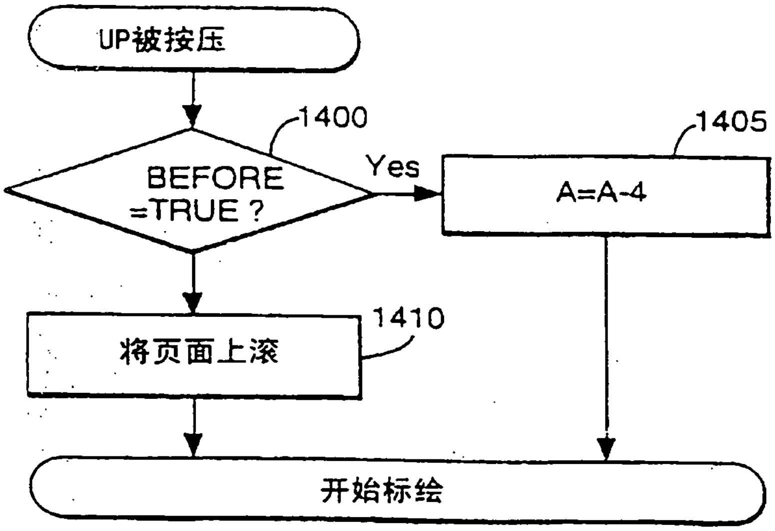

UP被按压
1400
BEFORE =TRUE ?
Yes
1405
A=A-4
1410
将页面上滚
开始标绘

图14

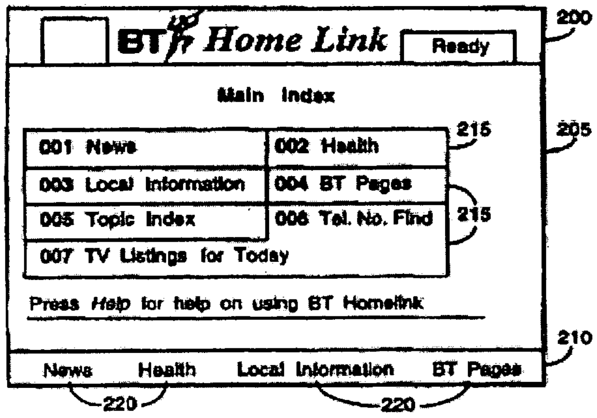
Original PCT application to the D1

Patent number: WO9749044

Applicant: BRITISH TELECOMM (GB); EDWARDS NICHOLAS HECTOR (GB); RUSS MARTIN (GB); GARNER PAUL (GB)

Abstract of **WO9749044**

An interface (105, 125, 120) for a World Wide Web (WWW) (110) browser is described which recognises HyperText Markup Language (HTML) links embedded in WWW pages. Normally, such links are highlighted on a graphics screen and are activated using a pointing device such as a computer mouse. When each HTML link is recognised by the interface (105, 125, 120), it is assigned an identifier which can be selected by a user of a system incorporating the interface by means defined by the interface other than a mouse, for example by a keypad (105).



Description of **WO9749044**

NETWORK BASED ACCESS SYSTEM

This invention relates to network based access systems in which access is provided by activating links in files containing addresses, for instance in the manner of activating links embedded in files written in HyperText Markup Language(HTML).

An increasing amount of information is becoming available on distributed communications systems. Most well-known perhaps is the World Wide Web (WWW) area of the Internet, accessed using WWW browsers. Pages consisting of text, graphics, audio files, video files etc. are each associated with an address in a distributed network by means of which they can be accessed. A review and tutorial on HTML, particularly its use in the Web environment of the Internet, is published in the paper entitled "Creating a Hypertext Markup Language Document for an Information Server" by JYM Chu, WL Palya and DEWalter in Behaviour Research Methods, Instruments and Computers, 1995, Vol 27(2), at pages 200205.

Pages, usually of text, are displayed on a screen. At system startup, the page displayed will usually be provided by a user's browser. Navigation from a first page to a location elsewhere in the network is achieved by means of a link embedded in the first page and visible on screen.

Usually, the link holds the address for the second location. When a user "clicks" on the link in the first page, the browser is activated to go to the location address heid by the link. Thus the author of any page can make other pages, files or applications accessible regardless of their geographical location by links from their own page to relevant locations in the Internet.

(The term "page" as used herein should not be understood to refer only to pages of text and graphics but also to audio files, video files, Virtual Reality files and computer applications (software) that may be made available via systems such as the Internet and WWW, if the context so indicates.)
Current WWW browsers such as Netscape use a click from a pointing device (for example a mouse) to select the links and thus to move between pages. That is, the device positions a cursor on the screen so as to identify a selected link.

Although 'point and click' navigation is intuitive to people familiar with computer graphical user interfaces, this is not the case for a large proportion of the population. Furthermore there are many situations where a pointing device is not suitable for reasons of: cost, complexity, reliability, size, environment, etc.

According to the present invention, there is provided an access system for accessing a location in a network by activating a link in a file, which link contains a location address or an identifier for a location address, which system comprises: i) means for retrieving one or more files; ii) means for searching a file so retrieved to locate one or more links embedded therein; iii) means for assigning an identifier to any link so located; iv) selection means for use by the user to select an assigned identifier; and v) activating means responsive to selection of an identifier to activate the associated link.

Depending on the nature of the link activated, or on the location associated with the link activated, the access system may then access a data file, such as text pages from the Internet, or may access other types of file, including videos or computer applications, such as conferencing applications.

The location associated with the link activated could alternatively be a location in a communications network, such as a telephone or facsimile number or an electronic mail address. Equipment to enable a communications connection to be established in this way is disclosed in copending British patent applications GB9619958.3 and GB9707712.7 filed on 29 September 1996, and 16 April 1997 respectively, in the name of the present Applicant.

By providing identifiers for the links, and providing a way of selecting a link via its identifier instead of operating directly, on-screen, on the link, embodiments of the present invention allow use of a different user interface from the pointing type of device, usually a "mouse", usually used with such links. This means that the user can choose an interface which is better suited to them or more available to them than pointing devices such as a mouse.

It is even possible, using an embodiment of the present invention, to select a link which has been presented to the user non-visualiy, for instance by sound.

One example of an environment in which a different user interface is already utilised for other purposes is in the home. Remote control handsets are frequently used to control domestic audiovisual equipment, for example: video tape recorders, hi-fi equipment and televisions. Also, a significant proportion of the television sets currently produced for use in the UK are equipped with Teletext which can only be accessed by using a remote control handset. This has established a familiar metaphor for controlling electronic equipment using a command-based control system - based on key-presses rather than pointing. Teletext only functions with prepared information however. It cannot be used in a dynamic, uncontrolled environment such as with information from the Internet.

Embodiments of the present invention can be provided for instance as a terminal, or the like, which can display pages from the World Wide Web, using an alternative "command-based" interface to select identifiers for links embedded in the pages seen on the terminal. For instance, there might be provided a simple Teletext-type remote control handset and simple coloured button-type labels for different links on the screen. The user operates the handset to select a label, rather than having to use a 'point and click' WWW-type Interface. Thus users do not have to position a pointer on the screen in order to select a path through a set of information pages.

Instead navigation can be achieved by a series of key-presses which activate links.

It should be noted that, although the specific embodiment described below uses a television screen to display the WWW information, the 'command-based' interface is not restricted to use with a television screen: a wide range of other displays can be used. For example, a display panel on a telephone could be used to display the information, with the telephone keypad buttons being used to control the navigation, or a mobile information terminal could be produced, combining the functions of a mobile phone, pager, and personal organiser, whilst using a minimal set of buttons.

An example of the use of telephone keypad buttons being used in conjunction with a screen display is described in copending European patent application number 97300929.3, filed on 13th February 1997 by the present Applicant.

The physical implementation of the command interface need not be based on a key-pad on a remote control handset. There are a large number of alternative ways of providing user commands, and some of these are also detailed below.

An application which could be accessed by an embodiment of the present invention is a conferencing application. Screen-based audio-conferencing applications are described in copending British patent application numbers GB 9620000.1, filed on 25th September 1996, GB 9620260.1, filed on 27th
September 1996, and GB 9705097.5, filed on 12th March 1997, and in copending

European patent application number EP 97302615.6, filed on 16th April 1997, all in the name of the present applicant. By accessing a location at which an audioconferencing application is accessible, the user would in fact most likely first be offered a text page for registration in the conference. Hence the launching of the conferencing application could be very similar to accessing a text page from the
Internet.

An application to be launched is determined by a file extension of the link address.

Another example of such an application is a video viewer which allows a user to view moving pictures. Many methods of coding moving pictures are available.

One widely adopted technique is that defined by International standard ISO
IEC11172 "Coding of Moving Pictures and Audio for Digital Storage Media at up to
About1.5Mbit/s", known as MPEG1. Files which conform to MPEG1 are conventionally named with a file extension of ".MPEG" or ".MPG". Files which are
TM TM suitable for viewing with aQuickTime viewer fromAppleTM conventionally have a file extension of ".MOV". If a link to such a file is located, an identifier Is assigned to the link and an application is launched automatically if a user has specified the application to be associated with a particular file extension.

Otherwise the user is asked to specify the application to be launched. Similarly a link may require a video conferencing application to be launched and a video conferencing connection to be established. Such links need to include an application specific file extension for example ".VCL" for a videoconferencing link.

A particularly advantageous aspect of the present invention is that difficulties which would normally be met in presenting Web - compatible pages on a screen not normally for that purpose can be overcome. As mentioned above, the links in a Web - compatible page are designed to be selected by the user using a pointing device to place a cursor at the position of the link In the text. Without a pointing device, it is not possible to select the link. However, by assigning amore generic identifier to the link, it becomes possible to use for instance a keypad.

The identifier assigned to a link may be any of several types of identifier. It needs to identify each link as different from other links viewable at the same time on screen and it needs to be selectable by a non-pointing device such as a keypad.

Hence, examples of identifiers assigned to links could include colours, each link being shown on screen in a different colour. Coloured buttons on a keypad could then be used to select a link. Just the initial letter of a link could be coloured.

Another example is a number. Each link could be shown on screen with a number added and a keypad could be used to enter the relevant number.

Numbers lend themselves to use where a link is presented to the user as sound instead of visually. The existing link could have a spoken number added to it and the user would use that number as the link identifier.

The identifier for a link can also be at least partly derived from the normal onscreen appearance of the link. For instance, the identifiers might be truncated versions of the text(or graphics) of the link itself. These identifiers might appear on screen in addition to the link itself. Hence the links may appear embedded in the text on screen as is usual with Web pages, but there may also be provided an area on screen which shows just the identifiers, for ease of selection. In order to relate the Identifiers to the links, it is useful that the identifiers include a truncated version of the text (or a symbol perhaps) from the relevant links. Embodiments of the present invention provide a means to generate that form of identifier at the client end, thus allowing any original text having embedded navigation links to be used with such embodiments of the present Invention.

In more detail, although it is possible for the author of a page incorporating a link to design the link specifically so that it could be used by embodiments of the present invention, in Internet environments that would clearly have to be done in the page stored at the server to be accessed. It would be impractical in the usual
Web-type environment to control the page design at all accessible servers. In order to make the system practical for all accessible pages, files, applications etc over the Internet, embodiments of the present invention are based on a client environment which controls the way the links are shown at the client end. That is, a client device is provided which reads retrieved links and converts them wherever necessary by assigning an identifier which may in practice replace or supplement the link as it was originally authored, for display at the client device.

As indicated above, it may be preferred, for clarity, that embodiments of the present invention display not only the links as they appear in a page of text, but also the identifiers, displayed in a dedicated area of the screen. These identifiers may be provided by a set of "hot buttons" which repeat the functionality of the links. For instance, it might be clearer to the user to have an array of buttons to select from, in an area across the bottom of the screen. This would be particularly so for a user familiar with the Teletext environment. Small display screens may not have the space available to show the page of text as well as an array of "hot buttons" having the originally authored on-screen appearance of the links.

Embodiments of the present invention can then be particularly useful by replacing lengthy link descriptors with simple identifiers, such as numbers or colours, at least for an array of "hot buttons" added to the page of text.

Embodiments of the present invention are useful in environments where the size of the text is large relative to the screen area available for display, but the user is still going to need to select links. This occurs, as mentioned above, in cases where the screen display is simply small, such as in an aircraft where individual screens are provided for users. It also occurs however where it is required to provide large text, for instance because the user has reduced visual ability or because the screen has to be visible from a distance. Embodiments of the present invention are generally useful in the manner in which link on-screen appearance can be tailored for the user environment without loss of functionality.

Ingenerate, embodiments of the present invention can provide a browsing capability, providing functionality for retrieving data and acting interactively as in known Internet browsers, with the added aspect of dynamic pre-processing of information at the user interface.

A terminal and interface system, herein referred to as "the Easy Terminal", will now be described as an embodiment of the present invention, by way of example only, with reference to the accompanying Figures in which:
Figure 1 shows schematically the main components of the Easy Terminal;
Figure 2 shows an example of a welcome screen;
Figure 3 shows an example layout for a remote control handset for use in the Easy Terminal;
Figure 4 shows a block diagram of the Easy Terminal hardware;
Figure 5 shows a flowchart overview of the software processes of the Easy Terminal;
Figure 6 shows a flowchart of a process used to analyse HTML to find links to other pages;
Figure 7 shows a flowchart of a process for creating text for text buttons in a display for the Easy Terminal;
Figure 8 shows a flowchart of a further process for creating text for text buttons in a display for the Easy Terminal;
Figure 9 shows a flowchart of a process for recording history of pages accessed by means of an Easy Terminal;
Figure 10 shows a flow chart of a process for responding to user selections by means of the remote control handset of Figure 3;
Figure 11 shows a flow chart of a process for ordering links displayed on a display by Easy Terminal; and
Figures1 2 to1 4 show flow charts of a process for clever scrolling of a screen display in Easy Terminal.

As described above, the Easy Terminal provides a simple information interface.

The system is designed to provide an Interface to electronic Information in the form of pages of text and graphics, audio tiles, video files etc. which can be accessed using key-presses. The Information is derived from the WWW and is simplified and processed before being displayed.

Referring to Figure 1, the main components of the Easy Terminal are a display 100, controlled by the user from a remote control handset 105. Information is accessed on the WWW 110 via a network connection 115, and processed by the Easy Terminal process software1 20.

Effectively, Easy Terminal provides a Web browser of known type but with a significantly different user interface providing significantly different control functionality.

The display unit 100 is a standard television. In order to ensure maximum legibility of text on the screen, large sans-serif fonts are used as much as possible. Antialiased fonts should be used if they are available. Text and background colours are chosen to ensure good contrast.

In addition to proportionately spaced text as described above, the screen can display high resolution colour images.

Referring to Figure 2, on switch-on, the user is presented with a welcome screen with a general layout divided into three sections:
Masthead 200
Body 205
Footer 210
The Masthead 200: the upper part of the screen acts as a fixed "masthead" which is used to identify the name of the service being provided, as well as provide feedback to the user. For instance, the number entered from the key-pad would appear at the upper left in this example, whilst the status appears at the upper right ('Ready').

The Body 205: the main portion of the screen is devoted to displaying WWW pages and/or processed WWW information. This part of the screen can be scrolled so that viewed pages can be larger than the available screen area. (The masthead and footer are not affected by this scrolling.) In general, pages which are displayed are made up of five major elements:
Headings which are normally large and in bold type. In this case, "Main Index"
is shown.

Text
Links 215 (normally shown as highlighted text with an optional preceding three
digit number
Graphics (pictures)Tables
Some pages, for instance home pages for particular services, may be simply a list of links from which the user can select further pages to access. The further pages will then generally comprise a mix of text and/or graphics and tables, with links embedded at irregular positions. The example shown in Figure 2 is of the home page type, showing simply a list of links.

The Footer 210: the lower part of the screen is also fixed, and provides space for four coloured text labels 220 - the colours are matched to the four colours of the buttons provided on the user's key-pad: Red, Green, Yellow, Blue. These are shortened versions of links 215 appearing in the body of the display 100 and are labelled with either descriptive text for the links 215 or a three digit number. The labels 220 enable any one of the links 215 in the body 205 of the display 100 to be activated. The labels 220 appear in a group of four and initially relate to the first four links 215 shown in the body 205 of the display. As the links shown in the body of the display are scrolled through, the labels can also effectively be scrolled through by activating a "Next" key on the keypad 105 which steps the labels on to show the next set of four links. Hence, if the labels display descriptive text or a link number, this can be changed as the links are scrolled.

When all the links have been scrolled through and displayed, then the first set are re-displayed.

If descriptive text Is used for the labelling, this can be derived from the link text shown in the body of the display 100.

Referring to Figure 3, the user may then access new WWW pages, which will take over the body of the display 100, using the remote control handset 105. The remote control unit 105 in this implementation is a television-type unit with a keypad. An example of a suitable handset has 25 buttons, as shown in Figure 3.

Twenty-five buttons represents a good compromise between the number of available functions and the numbers of buttons available on common remote control handsets.

Up and Down keys 300, 305 on the keypad scroll the current page seen in the body of the display 100 up and down. This can be done in a way which is referred to herein as "clever scrolling". The use of the Up and Down keys 300, 305 to move the on-screen view of the HTML page can be in two modes. The default mode is to provide scrolling which is related to the links on the page. When a page is initially displayed, the first four links are coloured to show their association with the four coloured buttons on the remote control or the on-screen coloured text label area. If the Down key is pressed, then the next four links on the page are coloured and the first four links revert to a default colour used to indicate links which are not available via the remote control or the on-screen coloured text label area. When the user presses the Down key, the system does a check as to whether there are links on the page which are not currently highlighted. When the last visible link on the page is coloured, then any subsequent pressing of the Down key will cause the screen to roll downwards (one line at a time) until either the end of the document is reached, or another link becomes visible which is not coloured.

A similar mechanism can be used for the scrolling upwards process.

"Clever scrolling" in this manner is described in more detail below, with reference to Figures 12 to 14.

A Back button 310 can also be used for scrolling upwards in a minimal-button interface.

A Next button 315 can also be used to scroll the display - but this is linked to the number of links which are visible on the screen, and is intended for specialist applications where a minimal button-set is required. The Next button scrolls the body of the display downwards until four links are visible. These can then be activated by respective coloured text labels in the Footer of the display1 00.

Pressing the Next button then scrolls the display to present either the next page of text, or the next four links. Links 1, 5, 9 etc are thus always associated with the

Red button, links 2, 6 and 10, etc the Green button, and so on.

In a non-minimal-button interface, the Next button is used to select the next four links on the page, regardless of their being displayed on the current screen - the coloured text labels would then update to reflect the change of links.

A Summary button 320 uses an online text summariser to produce a shortened form of the current page.

By pressing Help 325 and selecting Settings from a "user setup" page, the user may enlarge or reduce the size of the text, and select whether just text characters or pictures and text characters are displayed.

A new page may be selected by one of two methods:
Link and Number buttons
Navigation buttons
The Link and Number buttons are the four coloured buttons 330, plus the numeric buttons 335. As mentioned above, the links In the body of the display 100 may have a preceding three digit number. To use the Link and Number buttons to select a link to activate, either one of the coloured buttons 330 can be pressed, or a three digit code can be used, using the numeric buttons 335 on the keypad 105.

If one of the coloured buttons on the remote control is pressed, this will produce a new page corresponding to the appropriate coloured label 220 in the footer of the display 100. The label 220 will be showing a description Identifying the link it is currently related to in the body of the display 100 - it is this related link which will then be activated.

If alternatively a three digit code is entered, using the numeric keypad 105, as soon as the third button is pressed, then the associated link is activated and a new page is retrieved. If a correction is required, the most recently entered digit may be deleted with the Del key.

There are many possible Navigation buttons which provide dedicated functions when they are pressed. Some of the possibilities include:
Back 310 allows the user to return to the page previously displayed
Index 340 displays the main index page which is seen at switch-on
Help 325 displays a menu of help pages on the use of the terminal
Top 10 345 displays a list of pages which have been frequently and recently visited.

There are also three control keys which allow the user to control the loading of the pages:
Stop 350 Abandons the retrieval of a requested page. This may be used if the page is unavailable because of network problems or if the download is unacceptably slow
Undo (not shown! This button can be used to combine the functions of the Stop and

the Del key - using the context at the time of use.

Reload 355 This refreshes the current page, downloading a new copy from the
network. This may be used to ensure that the displayed page is up
to-date.

Smaller numbers of buttons can be used by omitting features, or by requiring combinations of buttons to be pressed simultaneously. A minimal set of buttons would be approximately six buttons: the four coloured buttons, plus the 'Next' button, and a 'Back' button. The precise function of the named buttons is described later.

An example of a minimal set of buttons is provided by the simple "game pad" controller - as used widely for home video/computer game consoles. The "game pad" consists of eight buttons arranged in two groupings: four coloured buttons plus an additional four buttons conventionally used to indicate direction, rather like a primitive joystick.

The utilisation of the game pad buttons in an embodiment of the present invention is as follows:
the four coloured buttons are used to select links on the page
"Up" and "Down" buttons which scroll the page and the coloured links (using
"clever scrolling" as described below)o a "Back/Delete" button. This functions as "back" except when the user is
editing text, in which case it functions as "delete"
an"Index/Finish" button. This takes the user to a main index page unless text
is being edited, in which case it finishes the text
Other minimal button interfaces are also possible. The interface provision of embodiments of the present invention can be easily extended.

Simple keypads that provide only the digits 0 to 9, plus two additional buttons (conventionally as a three column by four row block) can be used by redefining the function of the buttons on the keypad:
the "0" button becomes the "Back" button
the two additional buttons are used for paging upwards and downwards
Referring to Figure 4, the implementation of the Easy Terminal described here consists of a hardware platform and the associated software. The system is a linked mixture of hardware and software elements, and both parts are required to produce the display.

The hardware platform for the embodiment of the Easy Terminal described here consists of a number of components. Many of these would be common to most alternative implementations.

The components are detailed below:
Communications Network 110 An Ethernet based connection to the Internet
Network Link11 5 An Ethernet communications card for
a personal computer (PC)
Processor1 20 A Gateway P4D-66 IBM Compatible PC

Computer with 486 DX2/66 Processor.

Hard disk 43 A 540 MB Internal Hard Disk Drive
Infra-red Handset 105 A Propresenter Plus 25 button handset for PC
Infra-red receiver 41 A Propresenter URC receiver for PC
Graphics Card 44 An ATI MACH 64 PCI graphics card
TV Output 45 Derived using a Creative Laboratories TV Coder
for PC
The hardware is in four parts:
Control
Input
Processing
Output
The Control hardware comprises the Infra-red Handset 105 and Receiver 41.

The Input hardware comprises the Communications and Network Link 115, which connects the PC to the WWW 110.

The Processor1 20 itself carries out the Processing of the Control and Input data in order to produce the Output display.

The Output is in the form of a TV picture, produced from the computer display by using a graphics card and a specialised TV converter.

Figure 5 shows a flowchart showing an overview of the software and the processes carried out in the Easy Terminal. The code is written in Borland Delphi (Object Oriented Pascal) for Microsoft Windows 3.1. The primary steps are as set out in Figure 5:
STEP 520 : Search HTML file for links to other pages
STEP 545 : Fit coloured labels to screen and display
STEP 550 : Record history
STEP 555 : Display HTML
Referring to Figures 6, 7, 8 and 9, each of the primary steps 520, 545, 550, 555 shown in Figure 5 is now described In more detail.

Search HTML File for Links to other pages: STEP 520
An HTML file contains reference to other pages (also known as "links") in the following form: < A HREF = "page reference" > LinkText < /A > where the < a and < /a > are tags which indicate the beginning and end of the reference respectively. The page reference Indicates the WWW address of the page indicated, and will be in the form "http://... Note that those parts of the address which are the same as the present page are not always given, and that some expansion of the address is often required to create the complete address required.

Referring to Figure 6, when a new page is to be displayed in the body of the display 100,

it needs to be searched, STEP 520, for links to other pages so that those links can be differently displayed from ordinary text in the body of the display 100, and so that

The system will therefore start, STEP 500, for instance, when a new (unprocessed) page has been accessed, usually because it has been requested by a user.

STEP 600: The HTML file containing the page is opened and, STEP 605, the process will read each character of the text in turn to see whether it introduces a reference, or a link, to another page. To do that, it runs a test, STEP 610, "Does text read " < a' ?" If the answer is yes, the process will read the file through to the symbol " < /a > ", STEP 615. Between these two symbols, the process takes the text as a page reference, or link, STEP 620, and evaluates that link for its full path name, STEP 625. (Often HTML addresses are abbreviated to the parts of the address which are different from the current page address. It Is necessary to expand these partial addresses so that they can be compared with stored addresses in the history lists etc). The system then adds the link to a list of the links or page references for the page being searched, STEP 630, and stores the text of the page reference prior to processing for the labels, STEP 635.

In STEP 640, the system will add a three digit number to the front of the page reference, or link text, for display in the body of the display 100. This three digit number is also added to the appropriate page reference in the list of links found in the page being searched and will appear in, or at least be correlated with, a label at any time that the relevant link is one of the first four links displayed In the body of the display1 00.

The process will then search for further links, until the end of the file is reached, STEP 645, and the process is terminated, STEP 650.

Shortening Link Text: STEP 545
The Easy Terminal displays four coloured text labels at the bottom of the screen.

Most Internet link descriptions are too long, and may require truncation in order that the total length of the four labels will fit onto the screen width in a font which is legible on the display.

For the television display used in this implementation, the link descriptions are thus processed in the following way prior to display in order to make them as intelligible as possible.

Referring to Figure 7, where the text from a page reference has been stored for processing to provide a coloured label, STEP 635, the next step is to process the text for each page reference. This process starts with a check, STEPS 700, 705, whether the page reference contains text to be truncated to provide a label or whether it contains an indicator that a label has already been supplied by a user. If the label has already been supplied, then the system will use that label, STEP 710.

The process stops for that particular page reference, moving on to start again for the next.

To allow an author (or other user) to provide the labels, a special-purpose HTML tag has been defined. This enables HTML authors to embed pre-prepared shortened text labels for the coloured text labels. An example would be: < A HREF = "page reference"HOTKEY= "Linki " > Link text < /A >
Thus the functionality of the < A command in HTML Is extended.

If the label has not been defined by a user, the process checks whether the page reference, or link, is a picture, STEP 715. If the page reference is indeed a picture, then the process looks for ALT text, STEP 720. If the text exists, this is used for deriving a label, STEP 725. If the ALT text is not there, then the system allocates a three digit number to the page reference concerned and uses this for the label, STEP 730.

Where the page reference was text, or ALT text existed, then the process starts truncating it. It removes any HTML commands, STEP 735. The page reference then has to be shortened.

First each link description is shortened to a length that represents the special case of four numbered links plus one text link, STEP 740. For the television example described here this is approximately 30 characters. Partial words left hanging at the end of a link are removed, STEP 745, and the link reduced by one character, STEP 750. Some unnecessary words such as "THE" and "A" may be removed to reduce the length of the link text still further, STEP 755. Words such as "AND" and "OR" can be shortened to " & " and "/", STEP 760. This process is a simplified form of the technique known as stemming, and more sophisticated processing may be used to improve the truncation efficiency.

Lastly, a number of non-standard HTML codes need to be converted before display, or removed, STEP 765. For example, a copyright symbol is written as & copy, and needs to be converted to (C) before display, whilst the emboldening command < B > and itsreverse < /B > need to be removed.

After this first truncation step, the labels, or "button information", are stored.

Referring to Figure 8, even after these modifications have been made, the combined link text from the four link labels may still be too long, and will overspill the width of the screen. When the relevant page is to be displayed, the system will then go into a second truncation process. At this stage, the labels are processed in the fours in which they will appear on the screen during display.

The second truncation process makes a check step on the length of the labels, STEP 800. If the labels in combination are wider than the screen, the maximum length of the link labels is reduced by one character (ie first to 29, etc) with the longest link label being processed first, STEP 805. This 'balances' the length of the label text between the links. Partial words at the end of the text are removed, STEP 810. Finally, words like "AND" and "OR" are removed if they are the last word in the label text, and therefore redundant, STEP 815. The reduction of the length is continued until the labels will fit on the screen, and then they are displayed, STEP 820.

Recording History: STEP 550
Referring to Figure 9, a history of the pages selected by the user is important for a number of reasons: 1) the user may wish to back-track to a page they have recently looked at 2) the user may select a list of the 10 most recently visited pages 3) the user may wish to see a list of the 10 pages which they frequently visit 4) a log of the activity may be kept
Most of these functions are relatively simple. However 3) listed above requires more sophistication.

In the current implementation the Easy Terminal maintains a list of the 10 pages most frequently visited in the last 7 days of operation. In order to do this it must first have a list of all pages which have been visited in the last 7 days: a history log containing counters, dates and addresses. The history log associates each page with seven day-counters which count the number of accesses of each page during that day.

Referring to Figures 5 and 9, when a new page has been accessed by a user, the page reference Is added to an unsorted log file, STEP 900. This Is a simple list of all pages accessed and can be effectively of unlimited length. The process of appending a new page reference is straightforward and not further described herein.

The new page reference is also added to a recently visited pages list, STEP 905.

The recently visited pages list is maintained at a length of 10 page references by running a check each time a page reference is added, whether the list has gone over 10, STEP 910. If it has, the oldest page reference is dropped, STEP 915.

Again, this list is unsorted.

As well as the unsorted log file, an alphabetic list of the names of all pages visited is maintained, together with a count of the number of times a page has been visited. To update the alphabetic list, a bisection search is carried out to find out whether the page has already got an entry, STEP 920. If no entry is present, then a new entry is created along with a new set of seven counters, STEP 925. If an entry is already present, then the relevant day-counter is incremented, STEP 930.

The alphabetic list allows the user to review which pages have been most frequently visited. A button on a keypad 105 or a three digit code, can be allocated to a function "Show 10 most frequently visited pages". If this is selected, the system can sort the alphabetic list according to the contents of the counters. Thus when a list of the 10 most frequently visited pages is selected, the system counts up the total number of times each of the pages in the list has been accessed over the last 7 days, and sorts the list so that the top ten entries can be displayed.

Each time a page is accessed, the counter for the current day is incremented.

When the beginning of a new day is detected, the counters are updated, and pages which have not been accessed over the last 7 days are removed from the alphabetic list.

Other schemes for maintaining a "Top 10" list are of course possible. Some possibilities are suggested below, in discussion of alternative embodiments and possible refinements in the present invention.

Displaying HTML : STEP 555
Commercially available HTML displaying software is used to display the modified HTML code. This is not therefore described further herein. A number of minor modifications need to be made to the code however to remove error messages when images are not displayed and to remove the underlining from HTML hotlinks.

Referring to Figure 10, the remote control handset 105 sends commands using a standard serial port protocol. When a button is pressed, a Windows event is generated which activates a subroutine with the function shown in Figure1 0. The user interface is thus a combination of the screen display 100 (specifically the coloured textlabels! and the coloured buttons on the remote control1 05.

When the button is pressed on the remote control 105, this activates the subroutine to retrieve the data incoming from the remote control 105 at the serial port, STEP 1000. The subroutine will then act on the data retrieved, firstly by matching the data against possible button identities, STEPS 1005, 1010, 1015, 1020, 1025, 1030, 1035. Depending on the outcome of each check, the subroutine will kick off a different process. For instance, if the key is found to be a digit key, STEP 1005, the subroutine will add the relevant digit to a current number selection store, STEP 1045. If there are now three digits in the current number selection store, this is sufficient to identify a page reference and the subroutine will translate the three digits to a page reference, STEP 1050, by reference to the link list maintained above at STEPS 630 and 640.

The subroutine is now enabled to fetch the page from the WWW.

If the key does not represent a digit but is a hotkey (that is, identifies a label), then the system will have sufficient information to go direct to the link list, STEP 1050, and fetch the page.

If the key provides any of the following functions, then the subroutine will fetch a page directly: "Index, Help, Top 10, Reload, Back or Summary", STEPS 1015, 1020.

The key may be a control key acting on the screen, such as "Down, Up, Undo", STEPS 1025, 1030. The subroutine will then scrollor,update the screen or undo the last key press appropriately.

The key may have been the key "next", for displaying the next four coloured text labels. In this case, the subroutine will recognise the "next" command, STEP 1035, and display the labels as requested, STEP 1065. To support the "Next" key function, the system has a counter which counts the number of times the Next key has been pressed while viewing a document. This enables the system to track which set of four labels should be being displayed.

The last option in this embodiment is that the key represents a "stop" command, STEP 1040. The subroutine will respond by abandoning loading of the next page, STEP 1070.

An advantageous feature for embodiments of the present Invention is to determine the order of links appearing in a page on screen, and therefore to control colour and/or number allocation, according to the position of the links of the screen rather than their order in the text. This can ensure that links will always appear in sequence when the document is read in a conventional direction , for instance from left to right and top to bottom in a Western environment. Problems can occur otherwise for instance in tables which can have the effect that numbers appear out of order on the screen - for instance when only a few links are visible in a multi-column table - the first column of links may only display one or two coloured or numbered links whilst the remaining columns have no coloured or numbered links.

This can be resolved by the system noting the co-ordinates of the links on the screen in the current viewed page whilst the page is being pre-processed. The links can be assigned to numbers in sequence according to their "y" and then their "x" co-ordinates. Once this order has been established, then the colours or numbers can be applied. This process will only need to be repeated for the page if the presentation of the page in the window changes, for example if the font size is changed.

Figure 11 gives an example of how improved link ordering could be implemented and the following description should be read in conjunction therewith.

The HTML is read in item by item (STEP 1100) . An item is either a section of text, a code or object within the page. The size of each item is then calculated, and then 'placed' on the page with an X and Y coordinate relative to the top-left of the page. If the object is a link (STEP 1105), the space would be left for later insertion of the link number (STEP1110). (If no improved link ordering was present, this link number would be a sequential number in the order in which the links were found in the HTML. Thus once the entire file had been read, the page could be drawn on screen).

However with improved link order, the X and Y co-ordinates of each link would be noted In integer arrays (STEP 1115) along with an index array N which would contain a sequentially assigned integer (L in the Figure) (STEP 1120).

Once the entire file has been read in, a ripple sort algorithm (STEPS 1125-1155) is used to find the link which is has the lowest Y co-ordinate, and is thus closest to the top of the page. If more than one link has the same Y co-ordinate, the links are ordered according to their X co-ordinate, so that the links read sequentially from left to right. This link is assigned to a number which is then increased by one. As the process is repeated, the links are thus ordered. Eventually the links are ordered according to their Y and X co-ordinates. The array N acts as a reference to the action which must be taken in the event of the link being selected.

For example, suppose the HTML is as follows < table > < tr > < td > < ahref = "Item 1 " > Appies > < /a > < br > < a href = "Item2" > Bananas > < /a > < /td > < td > < a href = "Item3" > Pears > < /a > < br > < ahref= "Item4" > Plums > < /a > < /td > < /table >
On a standard HTML browser, this will produce a matrix of 4 links
Apples Pears
Bananas Plums
Without Improved Link ordering, in Easy Terminal, the links are numbered according to the order in which the links appear in the HTML code, thus the links will appear as 001 Apples 003 Pears 002 Bananas 004 Plums
However, with Improved Link Ordering, the links will be re-ordered as: 001 Apples 002 Pears 003 Bananas 004 Plums and the array N will contain the elements (1,3,2,4). If the user now selects link 2,
Easy Terminal can use the reference array N to see that the second element N(2) is 3, and thus the appropriate action is that of the third link in the HTML, i.e. to reference"Item3".

Referring to Figures 12 to 14, Easy Terminal can provide "clever scrolling" as follows.

In "clever scrolling", it is possible to make the colour of all the text uniform (normally black), and then highlight the available links (associated with the coloured text labels) with the four colours. It is also possible to colour the unavailable links with a default colour (for example purple) so that the links can be identified on the screen. The Next/Down button can thus be considered as a button which moves the coloured(red, green, yellow and blue) labelling to the next set of purple links, whilst the Back/Up button moves the colours to the previous set of purple links.

When a request is made to plot the current page in the available window on the screen, the index of the first 'active link' to which a coloured button is assigned is noted as A (STEP 1200). Then the location of the first object which is visible on the page is determined (STEP 1205). If this object is a link (STEP 1210), then the index of this link, L, is compared to A (STEP 1220). If L is less than A, then there are links present on the page which the user can access by pressing UP, and these links are coloured purple. A boolean flag BEFORE is set to TRUE (STEP 1225), indicating that there are links with an index less than A present on the page.

Likewise if L > A+3 then there are links available to the user by pressing DOWN, so these links are also coloured purple, but the boolean flag AFTER is set to TRUE (STEP 1230). Otherwise, the link Is associated with one of the coloured buttons, and is assigned to be RED, GREEN, YELLOW, or BLUE (STEPS 1235). This process is repeated until all the items visible on the page have been plotted, and assigned to appropriate colours.

Referring to Figure 13, now if the user presses down and AFTER is TRUE (STEP 1300), then the active links are moved down the page by increasing A by 4 (STEP 1305). Otherwise, there are no further links on the page, and the page is therefore scrolled downwards if possible (STEP 1310).

Referring to Figure 14, similarly if the user presses up and BEFORE is TRUE (STEP 1400), then the active links are moved up the page by decreasing A by 4 (STEP 1405). Otherwise, there are no further links on the page, and the page Is therefore scrolled upwards if possible (STEP 1410).

ALTERNATIVES AND MODIFICATIONS

There are many alternative ways in which Easy Terminal could be implemented, which would provide a similar level of functionality to the user but with modifications to the hardware and software described. These are described and discussed below.

Although the specific embodiment described herein uses an IBM Compatible PC with an Ethernet connection, there are many alternative platforms on which the Easy Terminal could be implemented. Furthermore, the reprocessing and repurposing of the WWW information could be carried out remotely, or in the network, which could simplify the design of the user terminal hardware. Such an arrangement could be particularly appropriate where there are multiple users of the same system, such as in an interactive screen environment on an aeroplane for passengers.

A videophone could be used as a display for the Easy Terminal. Key stroke commands could either be taken from the videophone keypad, via speech recognition, or from an external controller.

A pager, watch, mobile phone or other mobile device could be used as an Easy

Terminal to display processed WWW information and using 'minimum button set' navigation techniques as described herein.

The Easy Terminal software could of course run on any computer platform which had sufficient speed, memory and display capabilities. This could be provided for instance by a video recorder, satellite broadcast receiver, digital broadcast decoder, digital video player or a games console.

The Easy Terminal could run on an appropriately adapted "interactive TV" or "Video on Demand" system. This could be implemented either by running the Easy Terminal at the user's premises or at the content provider's. Thus in the first case, the data transmitted across the connection would consist of a conventional Internet data stream, and in the second it would consist of either an encoded video signal or an embedded data stream.

An EasyTerminal could be built in to a television receiver in much the same way that Teletext is currently included in the design of television receivers. In this case it would be possible to improve the quality of the display by using a non-interlaced high definition mode.

The Easy Terminal could be implemented in two parts: a standard Internet browser at the user terminal modified to interpret commands with a remote control 105, and a network based processor which modifies standard World Wide Web pages as appropriate.

The Easy Terminal could use any appropriate communications medium for the transfer of data. This includes, for example, a fixed or mobile telephone network, a broadcast TV service or radio paging service.

The Easy Terminal could use any suitable remote control unit 105, or alternative source of user commands. These could include:
Larger controllers with alphanumeric keys. Foot control pads, or controllers involving other parts of the human body
Connections other than infra-red, including radio or wired links.

User independent speech recognition could be used as a substitute for a key based controller - thus simple words such as 'red' and 'next' or 'twenty-three' could provide the means of navigating between links.

In all of these alternatives, the principle of the Easy Terminal Navigation remains the same: the user does not have to position a pointer In order to activate a command. However, embodiments of the present invention do not exclude the use of a pointng device. A mouse or a trackball can still be used for instance.

This enables the same user interface as a conventional browser but still brings advantages related to the present invention. For instance, an on-screen bar used for coloured text labels can be used as a way of quickly selecting links without the need to move the mouse pointer to the specific location of the actual link itself.

This could be important to people whose control over the mouse is limited, eg by physical impairment or by an environmental condition such as severe vibration.

The coloured text labels could be replaced by coloured boxes to make this relationship explicit for those with impaired vision - which links into the particular ability of embodiments of the present invention to display text at large font sizes.

The mouse driver software could be adapted to restrict the mouse pointer position on the screen - limiting the movement to horizontal positions ove rthe coloured text label bar for instance, or the position could be quantised to ease the selection of the four boxes/areas/labels.

For situations where a mouse is not appropriate, simpler control devices like paddles or foot controllers could be used to provide the same control ability as a mouse.

The Easy Terminal software could be written In any appropriate computer language or protocol. This could be implemented as a plug in to standard software, or in an Internet language such as Java.

A number of the features of the Easy Terminal could be implemented as processes carried out remotely with respect to the user. For example, the insertion of numbered links and coloured hot links need not necessarily be implemented at the user's terminal. Such a processor could be provided as a network or broadcast service.

The Easy Terminal could also provide rapid access to conventional Teletext pages.

These pages could be displayed either as facsimiles of the source pages, or could be enhanced using the display, linking and navigation techniques described here.

A facility could be provided for the input of text. This could be achieved in a number of ways. Some possibilities include: For any text field, the user could select from a number of options on the screen
(this is known as a listbox or 'pop-out' box). The options which appear in the box could include items already known from the setup of the Easy Terminal (the owner's name, address, telephone number etc.) as well as a history of recently entered text.

The user could make any combination of letters up by selecting letters one by one from a scrolling or rotating list, or a grid of characters.

Characters could be associated with the numeric keypad by pressing more than one button at once.

. Characters could be selected by pressing a button more than once. These characters could correspond to those currently written on telephone keypads.

For example, to select the character 'B' the '2' button would be pressed twice since it has the legend 'ABC'.

A full alphanumeric keypad could be included by having alarge number of buttons on the keypad, or the option of attaching a standard keyboard to the terminal.

The summarising features which are already part of the specific embodiment described above could be extended in a number of ways.

The user could be provided with the choice of a number of different levels of summary. This could be selected, for example, by repeated summary commands.

Summarising of text could be carried from one page to the next. Thus, once the summariser Is activated, it would be operational until a command Is given to disable it. This could be provided as an option or user preference.

The size of text used in HTML pages can be determined both by the author and the reader. The author of an HTML page can select the relative sizes of fonts with respect to a standard reference size: this can be varied throughout the document.

The reader may select a scaling factor to enlarge or reduce this reference size. A control could be provided to remove certain resizing information from the text so that fonts which are too large or too small are displayed in more appropriate sizes.

In addition, the ratio between the largest and smallest font sizes used on the display may be reduced in order to suit the type of display. For example, on a computer screen, headings in large font sizes are appropriate, whilst the same large headings may appear too large when viewed in association with blocks of text on a television screen.

Improved Navigation by Colours

A control could be given to allow a user to set up a choice of standard colours for the background, the text and the links, or to use the colours and backgrounds as selected by the author of the page. A further refinement would allow only specific colour combinations to be allowed, whilst those which would significantly reduce thelegibiiity of the page could be altered to maintain clarity.

As mentioned above, it is possible to use rectangular areas with coloured borders to indicate active areas. This can be extended to provide the option for coloured borders to picture elements (GIF graphics etc) on the screen. This enables links which are the equivalent of on-screen 'buttons' to be selected using colours.

Authors of HTML pages can suggest the background text and link colours for their pages. Certain colour combinations may be unsuitable for use with Easy
Terminal's colour navigation schemes. One example of this might be theiow contrast of a yellow link on a white page or a blue link on a black page. Easy
Terminal overcomes this by adjusting the navigation colours according to the background selected. For example, a white background will cause the link colours to be darkened, etc. If a background colour is particularly close to one of the link colours, then Easy Terminal will darken the background and lighten the link colour until a reasonable level of contrast is provided.

Navigation between pages could be achieved using one or more of a number of possible alternative schemes:Uniform Length Numbered Links
Numbered links of a uniform length within a page (e.g. 01 02...99) could be used to allow users with a numeric keypad to select a new page. The page retrieval could start as soon as the final digit is pressed. Note that the number of digits need not necessarily be three, as described above, and could be varied according to the number of links on the page. Thus a page with less than 10 links could use a single digit, whilst one with more than 10 would require two.

Variable Length Numbered Links
Numbered links with a length which is variable within a page could be used.

The user could indicate the end of a number either by pressing a return key or by having a set time-out after which the end of the entry would be assumed.

For example, links might be enumerated as (1, 2, 3....10, 11, 12). In this example, if a user pressed 1, there would be a time delay to allow the user to enter a second digit if required. On the other hand, if the user pressed 3, no time delay would be required as there are only1 2 links on the page. By techniques such as these, users can navigate by means of numbers only and can remove the coloured text labels if required.

Coloured Text Labels displayed Separate to the Main Text Body
As described above, coloured text labels which contain summaries of the link text on the page or specially written text can be displayed at the bottom of the screen, and activated by means of associated coloured buttons on a keypad 105. The number of labels need not necessarily be four, of course, but could be varied according to the width of the screen. When more links are present on the screen than there are associated labels, one or two additional keys (Next in our specific embodiment) could be used to cycle through the available links forward and/or backward.

Note that if the display used could not show text in different colours, coloured markers could be printed at the bottom of the screen close to the labels so that the association of the labels with the buttons is apparent.

Coloured Text Links within the Main Text Body
In an alternative method of navigation, the labels need not carry any text at all, but just be different colours. This would involve removing the colour information from the main body of the text so that most of the text is displayed in one single colour (for example black). Links embedded in the text could then be displayed in different respective colours, associated with very simple coloured labels at the bottom of the screen. Thus, in the case of our specific embodiment, with four coloured labels, the first link in the text would appear red, the second green, and so on. One or two buttons on the keypad 105 could be provided to cycle through the links so that different links would be highlighted, ready for activation. Links in the text could indeed be coloured instead of the labels on the bottom of the page.

Although the specific embodiment described above uses alternative navigation schemes to access hypertext links within an HTML document, the same navigation scheme could be used to access HTML labels within forms or any other object on an HTML page.

Graphical image maps could be included in the navigation schemes by overlaying links on the images. Thus with a numbered navigation scheme, numbered links could be associated with areas of an image in many different ways. For example,. the numbered link could flash over the active area of the imagea number could be written beside the image with an arrow pointing to the active
region
With a coloured navigation scheme, the active areas of the Image could be highlighted by means of, for example,a coloured frame round the active area of the image
changes to the colour palette Information over a local area of an Image, so that
part of an image appears predominantly the colour of a link colour a flashing filled area of the appropriate colour could indicate a link.

Since the links within a map are available as a map file, then the links contained within an image could be presented as a series of sets of four coloured text labels, which are scrollable using the Next command. In this case, the only description available for the link could be the address contained within the link itself, and so might contain useful information. One solution to this problem might be to preload the page pointed to by the link, and then use the title of that page as the text for the link label.

The number of keys used to control the system could be reduced or extended according to the hardware platform and the user requirements. A number of examples of variation in key layouts might be:
navigation between the pages could be done using either only numbers or only colours

on scrolling the page up and down, as abovementioned the sets of four active links, ie with associated labels, could automatically be altered according to those currently visible on the screen. Thus the functions of Next and Down in the specific embodiment described above would be combined.

the function of Up and Back in the specific embodiment described above could be combined.

Audio could be used as a means of reinforcement. Thus different sounds could be played in response to key presses or commands.

Graphics display techniques could be used to make the operation of the Easy Terminal more intuitive and apparent. A number of examples are given below: A graphical indicator could be used to show the user how much and which part of a page is currently being displayed on a screen.

The coloured text labels could be smoothly scrolled to indicate the relationship between different groups of labels. In the case of the specific embodiment described above, for example, upon pressing the Next button, the next four links would scroll into the visible part of the footer.

Shading could be used to indicate that there are regions of the page which are not currently visible on screen.

For certain applications, access could be restricted to a subset of the Internet by using a set of specially designed pages which only contain links to other pages within the set. It would also be possible to remove families of links according to where they point. For example, all links could be removed which start with"http://undesirable. com".

Other Methods of Controlling Easy Terminal 'Back' key
Selecting the '0' button on a keypad can act as a synonym for the 'Back' key.

Pressing &num; and* (or additional buttons on the keypad) will scroll the current page up and down by the height of the current screen window.

Remote Control
Easy Terminal may be controlled by other applications. Messages are passed from the controlling application to Easy Terminal using either Windows messaging (DDE, OLE, ActiveX, COM, Java) technique, or hooking Into the mouse or keyboard driver (by emulating key-presses, for example) on the same computer, or from other computer(s) or equipment via the serial, parallel or network ports. In one implementation of Easy Terminal the network-based control is achieved by using
TCP/IP. The use of Easy Terminal navigation with colours and numbers lends itself to remote control from other devices and to data-sharing applications because the controls and signals

are not governed by screen layout.

In particular, the ability to user simple keyboard commands to provide control over the display of Web pages is not commonly available in other browsers - the control is normally assumed to be via the mouse. The selection of links is normally carried out by using the mouse to point to a link (normally underlined and coloured blue on a conventional browser display) and then clicking the mouse button - in Easy
Terminal this can be achieved by using either the coloured text lables, or the coloured remote control buttons(or their equivalent). Scrolling on a conventional browser required precise movement of the mouse to the scroll bar, and then clicking or dragging, or else the use of the cursor keys on the keyboard. Easy
Terminal's clever scrolling requires just the 'Next' or 'Back' buttons to achieve the same functions - and combines the on-screen highlighting of available links as well.

Easy Terminal thus allows keyboard control of a browser, which could be
Important for any use where a mouse is inconvenient or reduces efficiency. One example of this would be in a situation where a person, whose typing skills are required for inputting information Into a computer, is also required to use a webbased page. Easy Terminal enables this person to keep their hands on the keyboard and still control and interact with the screen display. This could be particularly important in situations where time efficiency is paramount: Call
Centres, Directory Enquiry and other 'bureau' based applications.

Linked Easy Terminals

Two Easy Terminal equipped computers can be linked together so that command and control messages can be transferred between them using one of the 'Remote
Control' methods described above. This function is not currently available as a standard feature on other browsers. This allows the two Easy Terminals to be used for tutorial, education, illustration, form filling, and other instances where interactivity between more than one user is required. This is only possible because of the simple control interface to the web browser which Easy Terminal provides.

For example If two conventional browsers were linked together using application sharing, then control information about mouse position would form the majority of the transferred control messages, whereas for Easy Terminal a few button press messages would be sufficient.

The types of information which can be exchanged are not restricted to just control messages. Additional information such as display settings, the current document
URL, highlighted link and position within the document, current frame may also be transferred.

Highlighted numbers

A number of known techniques may be used to highlight numbers on the page.

This includes emboldening the number, displaying the number in "reverse video" (reversing number and background colour) or displaying the number with a different background colour.

Improved Page Presentation

Intelligent Masthead

The masthead which displays information to the user such as numbers pressed, the status of the current page or other Instructions is only displayed where necessary. Thus when a page is fully loaded and is being displayed, the full area of the display is available.

Limited width pages

Standard HTML browsers allow pages to have variable widths and heights. If either the width or height exceeds the screen parameters then the user Is given the ability to scroll the document across the screen. Easy Terminal allows the user to scroll the document up and down, but not left and right. In other words, the page is never allowed to exceed the display width. This is achieved in the following ways.

Text is conveniently wrapped at spaces and line breaks such that it fills the width of the screen. However If a single word is wider than the screen than the document must be scrolled to view the word. In Easy Terminal the font size of the word is reduced such that it fits in the available space.

If an image is wider than the screen then it is scaled preserving its aspect ratio so that it fits the screen.

If a table is wider than the screen then its column widths are reduced such that the ratio of the desired widths remains constant. Text and images within a table are scaled to fit the table cell if required.

Redundant Link removal

The HTML processor can consider two adjacent (successive) links on the same page as being the same. Thus a picture and accompanying text (which both point to the same URL) are indicated as the same link by colour and/or number, for example.

Form Control Objects

Conventional browsers use on-screen control objects to provide user interaction with devices like buttons, checkboxes and listboxes - typically used in forms. User interaction with these typically involves mouse ciicks. The on-screen control, size and colour of these objects is fixed by the operating system and cannot be easily changed. When the font size used to display the text is changed, these objects do not scale to compensate, which means that, for large font sizes, they are disproportionately sized.

Easy Terminal can display standard HTML form control objects - but it displays these by redrawing them from graphics primitives rather than using the standard operating system provision. This enables the size and other properties of these objects to be controlled. For example, each form control object can have a colour, a number and is scaled according to the size of the current font.

Typical control objects include:
Name Function
button submit a form or make a direct selection radiobutton select only one of a number of options checkbox select many options combobox select one of a number of pop-up options listbox selection one or more of a number of listed options editbox type in a single line alphanumeric string using a keyboard
carousel textarea type in multiple alphanumeric strings
Some of the form control objects can be assigned to special functions such as a control screen.

As with other Easy Terminal user interface features these control objects can be manipulated using numbers of colours. Some of these: the combobox, listbox, editbox and textarea require the user to select items within the control, again by number or colour. In the case of the combobox and listbox, the items are numbered and coloured; in the edit box and text area, the carousel of letters is controlled via colour, and the control focus is shifted from the page to the control.

Coloured links on the page temporarily revert to the default link colour whilst the focus is in the control object. The coloured text labels at the bottom of the screen reflect the current colour selection options available to the user - In the case - the control object options.

Once the user has completed the selection within the control object, the focus returns to the page, and the link colouring will return.

Slideshows
A Easy Terminal Slideshow consists of a series of files or URLs and timing information. When the slideshow Is selected the URLs are displayed in sequence until Interrupted by the user.

The slide show Implementation of Easy Terminal uses files with the extension type.sho. These files consist of a list of times in seconds and URLs, for example: 10 URL1
5 URL2
In this example, URL1 will be shown for a period of 10 seconds, and URL2 will be shown for 5 seconds. After this, the cycle will be repeated until the user intervenes by pressing any of the control keys.

This functionality is attractive because no modifications are required to the pages
In order for them to be used in a slide show.

This function can also be used with linked Easy Terminals where two users can view the same slide show. The slide show stops when either user presses a control key.

Claims of **WO9749044**

CLAIMS

1. An access system for accessing a location In a network by activating a link in a file, which link contains a location address or an identifier for a location address, which system comprises: i) means for retrieving one or more files; ii) means for searching a file so retrieved to locate one or more links
embedded therein; iii) means for assigning an identifier to any link so located; iv) selection means for use by the user to select an assigned identifier; and v) activating means responsive to selection of an identifier to activate the
associated link, 2. A system according to Claim 1, wherein the activating means activates the associated link so as to retrieve a file located at an address contained in or identified by that link.

3. A system according to Claim 1 or 2, wherein the activating means activates the associated link so as to launch an application associated with the link.

4. A system according to Claim1 2 or 3, wherein the system further comprises a display control output for use In displaying the file containing the link to be activated.

5. A system according to Claim4 wherein the system is further provided with a user Input for display control commands, and control means to receive such control commands and to control the display In accordance with said control commands.

6. A system according to any one of the preceding Claims, wherein the system is provided with a translation data store for use In translating an identifier, when selected by use of said selection means, to an activatable link.

7. A system according to any one of Claims 4 to 6 wherein means is provided to process at least one activatable link in a retrieved file, prior to display, so as to modify the on-screen appearance of the link.

8. A system according to Claim 7 wherein the on-screen appearance of the link Is modified by the addition of the identifier assigned to that link.

9. A system according to Claim 8 wherein the identifier comprises a number.

1 0. A system according to either one of claims 8 or 9 wherein the identifier comprises a colour.

11. A system according to any one of claims 4 to 10 wherein means Is provided to process at least one activatable link in a retrieved file so as to generate a second on-screen appearance of the link.

1 2. A system according to Claim 11 wherein means is provided to process at least two activatable links In a retrieved file so as to generate second on-screen appearances of each respective link, and means Is provided to display a set of said second on-screen appearances

of the links,separateiy from other content of said retrieved file.

1 3. A system according to either one of Claims 11 or1 2 wherein each said second on-screen appearance(s) of a processed link is different from the first onscreen appearance(s) of the associated processed link.

14. A system according to Cl;aim 13 wherein said second on-screen appearance of a processed link comprises substantially only the identifier for that processed link.

1 5. A system according to any one of claims1 2 to1 4 wherein said set comprises a smaller number of second on-screen appearances of processed links than the number of links In a retrieved file.

1 6. A system according to Claim 15, said system being provided with link selection control means for use by the user to select the links in a retrieved file whose second on-screen appearances appear in said set.

1 7. A system according to Claim1 6 wherein the system has means to respond to a scroll input, by means of the link selection control means, to scroll the set of second on-screen appearances of links in relation to the links in a retrieved file.

1 8. A system according to Claim1 7 wherein the means to respond to a scroll input comprises: I) means to compare the currently displayed set of second on-screen appearances of links with the currently displayed first on-screen appearances of the links In a retrieved file; andmeans to scroll the portion of the retrieved file currently displayed in the event that the last of said set and the last of the first on-screen appearances of the links, in the scroll direction, both relate to the same link.

19. A system according to any one of the preceding Claims wherein means Is provided to process at least one activatable link in a retrieved file, prior to display, so as to incorporate timing information, and wherein said activating means activates said processed link so as to display a file retrieved for a period of time determined by said timing information.

20. A system according to any one of the preceding claims wherein the selection means comprises a remote control device. for Instance based onintra-red transmission.

21. A system according to any one of the preceding claims wherein the system is further provided with means for processing links, located by the means for searching a file, to generate an Identifier for each link from information contained in the link, and means for displaying the file together with one or more identifiers so generated.

22. A system according to Claim 21 wherein the means for processing links comprises a truncation device for generating a truncated version of a link.

23. A system according to any one of the preceding claims which further comprises means for preparing files with one or more embedded links and loading a prepared file to the system, at least one embedded link In a prepared file including, at least part of, an identifier to be assigned by the means for assigning identifiers, and further including an alertrecognisabie by the system to alert the system that said embedded link includes such an identifier or part of an identifier.

24. A system according to any one of the preceding claims wherein the file is written In HyperText Markup Language.

25. A system according to any one of Claims 4 to 24, which further comprises means for determining spatial co-ordinates for links located In a file, said spatial coordinates relating each link to its location In the file when displayed, and the means for assigning an identifier assigns an Identifier to each link in accordance with its spatial co-ordinates.

26. A system according to Claim 25 wherein said spatial co-ordinates are based on perpendicular axes and the means for assigning an Identifier gives preference to the co-ordinate for one of the perpendicular axes, In assigning identifiers to a respective link.

27. A system according to any one of the preceding claims wherein the system further comprises display control means to control the on-screen appearance of a file, in addition to the on-screen appearance of one or more links embedded in the file.

28. A system according to any one of the preceding claims wherein the activating means activates the associated link so as to set up a communication connection in one or more communication networks.

29. A system according to any one of the preceding claims, comprising a television display output for displaying a retrieved file.

30. An information network browser comprising a system according to any one of the preceding claims.

31. An information network browser for locating, retrieving and displaying files stored at a location accessible by means of an information network, said browser comprising means to process a retrieved file prior to display.

32. A browser according to Claim 31 wherein said means to process a retrieved file comprises means to identify an activatable link embedded In said file to generate an Identifier for a link so identified, and to display the Identifier together with the link, the browser further comprising selection means for use by the user to input the identifier so as to activate the link.

33. A browser according to Claim 32 wherein the selection means comprises an array of independently selectable Input means, each Input means being dedicated to a respective identifier.

34. A browser according to Claim 33 wherein the selection means comprises a keypad.

34. A browser according to any one of clams 31 to 33, further comprising control means for use by the user to control the display.